FINAL PRELIMINARY ASSESSMENT REPORT

4K INDUSTRIAL PARK SITE
MARTINS FERRY, BELMONT COUNTY, OHIO

Prepared for

U.S. Environmental Protection Agency
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ABBREVIATIONS

AOC	area of concern
AMS	Austin Master Services, LLC
BEHRP	Bureau of Environmental Health and Radiation Protection
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
CORR	Concerned Ohio River Residents
DOGRM	Division of Oil and Gas Resource Management
ECHO	Enforcement and Compliance History Online
EPA	U.S. Environmental Protection Agency
gpd/ft^2	gallons per day per square foot
gpm	gallons per minute
HRS	Hazard Ranking System
MCL	EPA Maximum Contaminant Level
NFRAP	no further remedial action planned
No.	number
NORM	naturally occurring radioactive material
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
OAC	Ohio Administrative Code
ODH	Ohio Department of Health
ODNR	Ohio Department of Natural Resources
Ohio EPA	Ohio Environmental Protection Agency
ORP	Ohio River Partners, LLC
p.	Page
PA	preliminary assessment
PA/VSI	preliminary assessment/visual site inspection
PCB	polychlorinated biphenyl
pCi/g	picoCuries per gram
Phase I	Phase I property assessment

ABBREVIATIONS

pp.	Pages
PRG	preliminary remedial goal
RCRA	Resource Conservation and Recovery Act
Ref.	Reference
SI	Site Inspection
Severstal	Severstal North America, Inc.
SNM	special nuclear materials
START	Superfund Technical Assessment and Response Team
SWMU	solid waste management unit
TDL	target distance limit
Tetra Tech	Tetra Tech, Inc.
TENORM	technologically enhanced naturally occurring radioactive material
TLD	thermoluminescent dosimeter
VOC	volatile organic compound
WPSC	Wheeling-Pittsburg Steel Corporation
WWTP	Wastewater Treatment Plant
µg/L	micrograms per liter

1. INTRODUCTION

The U.S. Environmental Protection Agency (EPA)—per the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986—tasked the Tetra Tech, Inc. (Tetra Tech) Superfund Technical Assessment and Response Team (START) to conduct a preliminary assessment (PA) of the 4K Industrial Park Site[1] at 1001 Main Street, Martins Ferry, Belmont County, Ohio (EPA Identification Number [No.] OHD010448231) (References [Refs.] 1; 2). For the purposes of this PA report, the site is any area or areas where a hazardous substance has been deposited, stored, disposed, or placed or has otherwise come to be located (for example, through migration) from the 4K Industrial Park Site current operations at 1001 Main Street, Martins Ferry, Belmont County, Ohio, excluding those areas regulated under the EPA Resource Conservation and Recovery Act (RCRA) Corrective Action Program. START completed the PA under Contract No. 68HE0519D0005, Task Order – Task Order Line-Item No. F0072-0001DE102; this report summarizes the results.

START conducted the PA in response to a petition submitted under Title 42 of the United States Code Section (§) 9605(d) from the Concerned Ohio River Residents (CORR) to EPA Region 5's Regional Administrator Debra Shore on April 4, 2022 (Refs. 4, page [p.] 1; 5, p. 1; 6, p. 1). The petition stated that, in July 2021, citizens obtained inspection reports for 1001 Main Street that noted ongoing issues at the site, including: (1) the improper containment of unidentified material; (2) "tracked" water and waste around the facility and exiting the building; (3) leaking tanks with unidentified contents; and (4) a leaking roof (Ref. 6, p. 1). The petition requested that EPA perform a PA and visual inspection of the site (Ref. 5, p. 4).

A PA is a limited-scope investigation performed on every Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) site based on readily available information. Its purpose is to differentiate locations that pose little or no potential threat to human health and the environment from those that warrant further investigation. Generally, PAs support emergency response and removal activities, fulfill public information needs, and furnish appropriate information about a site early in the assessment process. The scope of START's PA included: (1) reviewing existing information about the site; (2) collecting additional information about the site, with an emphasis on target information; and (3) evaluating all information to develop a site score (Ref. 8, pages [pp.] 4–5).

[1] The 4K Industrial Park Site can be found under numerous alternative names, all of which are provided in Table B-1 of Appendix B and Reference 3, page 2.

PA also identify sites requiring assessments for possible emergency response actions (Ref. 8, p. 2). The PA is a relatively quick, low-cost compilation of existing information about the site and its surrounding area, with an emphasis on obtaining comprehensive information on targets—that is, people and resources that might be threatened by a release from the site. Investigators generally do not sample during a PA (Ref. 8, p. 5).

When a PA recommends further investigation, investigators perform a site inspection (SI), typically by collecting waste and environmental samples, to identify the substances present at a site and whether they are being released to the environment. The objective of a SI is to identify which sites have a high probability of qualifying for the National Priorities List (NPL), which identifies sites where EPA may conduct remedial actions. A second objective is to identify sites posing immediate health or environmental threats that require an emergency response (Ref. 8, p. 2).

Following a SI, EPA applies the Hazard Ranking System (HRS) to derive a site score and determine either that further investigation is necessary or that the site should receive a "no further remedial action planned" (NFRAP) recommendation. EPA adopted the HRS to prioritize further evaluation and eventual remedial action at hazardous waste sites; it is the primary method of determining a site's eligibility for placement on the NPL. A NFRAP recommendation means that further action under the Superfund program is not planned; however, such sites may be reexamined later if warranted. File information for NFRAP sites is provided to the state or other regulatory authorities, which may also act independently (Ref. 8, p. 4).

Using the information collected for the PA, START evaluated the site according to the EPA HRS criteria to assess its relative threat of actual or potential releases of hazardous substances. Developing an HRS score usually requires extensive analytical data along with other information about the site and its surroundings. At the PA stage, where the scope of investigation is limited, it is not generally practical to apply the HRS in its entirety, as the PA is a screening tool (Ref. 8, p. 5).

START developed this PA report per EPA's *Guidance for Performing Preliminary Assessments under CERCLA* (Ref. 8) and the HRS Final Rule (Ref. 9). It is organized as follows:

- Section 2.0 discusses the site background, including its location, description, history, and previous investigations.
- Section 3.0 identifies the source areas and waste characteristics.
- Section 4.0 presents a pathway and environmental hazard assessment describing the groundwater, surface-water, and air migration pathways as well as the soil exposure and subsurface intrusion pathway.

- Section 5.0 summarizes the PA and its conclusions.
- Section 6.0 lists the sources referenced in this report.

Additionally, figures are in Appendix A, and site ownership operations history and inspection summary tables are in Appendix B.

2. SITE LOCATION AND BACKGROUND

This section discusses the site background, including its location, description, and history.

2.1. SITE LOCATION AND DESCRIPTION

For the purposes of this PA, the site is any area or areas where a hazardous substance has been deposited, stored, disposed, or placed or has otherwise come to be located (for example, through migration) from the 4K Industrial Park operations at 1001 Main Street, Martins Ferry, Belmont County, Ohio, excluding those areas regulated under the EPA RCRA corrective action program (Ref. 8, pp. 16–19). These areas are summarized in Reference 10 and Appendix B, and their locations are shown in Reference 10 and Appendix C.

The site includes the 4K Industrial Park at 1001 Main Street, Martins Ferry, Belmont County, Ohio with a latitude of 40.102121 and a longitude of -80.712329 as measured from the center of the park (Refs. 1; 2) (Figure 1 in Appendix A). Austin Masters Services, LLC (AMS) is a tenant at the 4K Industrial Park, in Buildings 255 and 256, with an address of 801 North 1st Street, Martins Ferry, Ohio, 43935 (Refs. 7; 13, p. 8; 20, pp. 7–8). The 4K Industrial Park is on approximately 54 acres of land along the border between eastern Ohio and northern West Virginia (Ref. 10, p. 3). The industrial park is bordered to the east by the Ohio River, to the northwest by Dewey Street and Ohio Route 7, and to the southwest by Avondale Street. The land surrounding the industrial park is primarily commercial and industrial; however, several residences are also located within 500 feet of the site boundary (Appendix A, Figure 2).

2.2. SITE OWNERSHIP HISTORY

Table B-1 of Appendix B summarizes historical site ownership and occupation. The site was first developed in 1874 by the Ohio City Nail Works Company and later acquired by the Laughlin Nail Company in 1878. When fires destroyed the site in 1881 and 1885, the Laughlin Nail Company expanded operations such that, by 1895, the site included a nail factory and a tin plate factory (Ref. 10, p. 3).

Between 1900 and 1908, Wheeling Corrugating Company—which became part of the Wheeling Steel Corporation in 1920—purchased the nail factory portion of the site; by 1900, the tin plate factory was sold to the American Tin Plate Company, which maintained operations until sometime between 1924 and 1959, when it sold the factory to Wheeling Steel Corporation. In 1968, Wheeling Steel Corporation merged with Pittsburgh Steel Company to form Wheeling-Pittsburgh Steel Corporation (WPSC) (Ref. 10, p. 3); Esmark

Incorporated acquired WPSC in 2007, and in 2008, Severstal North America, Inc. (Severstal) acquired Esmark Incorporated, thereby claiming ownership of the site (Ref. 10, p. 3).

In 2012, 4K Industrial Park, LLC purchased 37.5 acres of the 54-acre site for commercial leasing. The company acquired authorization from the Ohio Department of Natural Resources (ODNR) to operate a water treatment facility—for recycling and treating hydraulic fracking waters and drilling fluids—from 2016 to 2018 (Refs. 10, p. 4; 60, p. 1). In 2013, Ohio River Partners, LLC purchased 9.91 acres of the site for a limestone storage area. Finally, in 2014, AMS became a tenant at 801 North 1st Street, Martins Ferry, Ohio within Buildings 255 and 256 of the 4K Industrial Park (Refs. 7; 10, pp. 8–9; 11, p. 7).

2.3. SITE OPERATIONAL HISTORY

From 1874 to 2012, the site produced various steel products for the construction, container, appliance, converter/processor, steel service center, and automotive markets. Thereafter, the site discontinued steel production and became an industrial park, but the associated wastewater treatment plant (WWTP) continued to treat brine generated from fracking from 2016 to 2018 (Refs. 10, pp. 3, 8; 11, pp. 4, 7; 60, p. 1). The source of brine is not identified in reference documentation; however, site inspections identified a truck loading area and determined that brine came from exploration and production operations. Brine was delivered in trucks to the site, treated, then returned to the fracking operation and used for fracking (Ref. 15, p. 13). ODNR temporarily granted authorization for 4K Industrial Park to operate this brine water recycling and treatment facility, stating that the existing WWTP may be used in recycling and treating hydraulic frac waters and drilling fluids. The treated water would be recycled back to the drilling companies for reuse (Ref. 60, p. 1).

The following sections provide a detailed history of the site's operations. Table B-1 of Appendix B summarizes historical site ownership and occupation, and Table B-2 of Appendix B summarizes historical site activities.

2.3.1. Wheeling-Pittsburg Steel Corporation – Martins Ferry Plant

The WPSC facility held RCRA Permit OHD010448231 for the treatment, storage, and disposal of waste generated by operations on the site (Ref. 3). The facility was comprised primarily of two plants. The first, Plant No. 1, was situated at the northeastern end of the property and served as the ware galvanizing area. By 1996, its manufacturing operations were discontinued; the plant then served as a storage area until it was demolished in 2004. The second, Plant No. 2, occupied the bulk of the property southwest of the former

Plant No. 1. Plant No. 2 included three continuous hot-dip galvanizing lines for the application of a zinc coating on steel sheet marketed under the SofTite brand. This process—which includes the application of a thin layer of zinc to the steel surface—prevented corrosion of the steel product. Each galvanizing line included an alkaline cleaning bath, a hydrochloric acid bath, an ammonium chloride flux tank, and a flux dryer along with an oil coating unit and an ink labeling unit. The plant's temper mill either improved the steel finish and texture or developed the required final mechanical properties prior to product shipment (Refs. 10, p. 6; 12, p. 9). Numerous materials and waste storage areas, including several tanks, were located throughout the Plant No. 2 area (Refs. 10, p. 5; 12, p. 54). Page 3 of Attachment 1 includes an excerpt from Reference 12, showing a detailed layout of the former WPSC facility.

The industrial WWTP was on the southeastern portion of the property, immediately south of North 1st Street (Appendix A, Figure 2). It received process wastewater and "sonic" stormwater (which is not defined in reference documentation). Because these waters were primarily acidic, they were neutralized with lime and aerated to form a precipitate that, after solidification, was removed from the WWTP for disposal as a nonhazardous sludge. The site discharged treated industrial wastewater, noncontact cooling water, and stormwater into the Ohio River through five outfalls on the southern side of Ohio Valley Parkway (North 1st Street) (Refs. 10, p. 5; 12, p. 6).

According to a December 1983 petition submitted by WPSC to EPA to reclassify WWTP sludge as non-hazardous waste, the WWTP treated all pre- and post-galvanizing wastewaters and emission control scrubber waters. The petition was successful, and the WWTP sludge was classified as non-hazardous. The WWTP included equalization tanks for certain wastes, two-stage neutralization with lime, sludge return, flocculant additions, and sedimentation and sludge filtration. In 1982, the site produced approximately 3,900 tons of sludge (Ref. 10, p. 7).

On January 30, 2002, WPSC acquired a Title V air pollution permit (Permit P0089035) for Martins Ferry (Facility Identification No. 06-07-09-0013) (Ref. 11, p. 12). The permit covered emissions from the baghouse dust collector for the zinc ammonium chloride flux process at the galvanizing lines as well as fugitive dust emissions from the roadways (Ref. 13, p. 15). The facility also held national pollutant discharge elimination system (NPDES) permits for five outfalls that discharged into the Ohio River:

- Outfall 001 applied to discharges of stormwater runoff from the most heavily industrial portions of the WPSC facility, effluent from the on-site WWTP, process water, boiler blowdown, steam condensate, and non-contact cooling water.
- Outfalls 002 through 005 applied to stormwater discharges only.

Over time, Outfalls 002, 003, 004, and 005 were abandoned and plugged (Refs. 12, pp. 6–7; 14, p. 3). Outfall 001 continued to accept effluent from the on-site WWTP until sometime prior to 2018 (Refs. 10, p. 9; 11, p. 69; 12, pp. 6–7). Currently, Outfall 001 is no longer listed as a NPDES-permitted outfall (Ref. 63). Stormwater runoff from the site is directed to the Belmont County storm sewer system, which discharges into the Oho River (Ref. 69).

In April 2010, Civil & Environmental Consultants, Inc. produced a Phase I property assessment (Phase I) report for the facility under the Ohio Voluntary Action Program. The report states that the facility was on 57 acres and included two steel mills—namely, the two WPSC plants (Ref. 13, pp. 1, 3, 12). Mill No. 1 was demolished on an unknown date, and Mill No. 2 was used for steel manufacturing. The Phase I report also noted that the facility had a parking lot, a WWTP, an oil house, and offices (Ref. 13, pp. 1, 32). The existing WWTP received process water from Mill No. 2 and discharged the water into the Ohio River per a NPDES permit (Ref. 13, pp. 3, 14, 22). Additionally, there was a coal-fired boiler at the facility with an associated coal storage pile (Ref. 13, pp. 3, 9, 25). Gas boilers replaced the coal-fired boiler in 1992 (Ref. 13, p. 25).

The Phase I report also noted that hazardous substances at the facility included alkali and acid cleaning solutions, chromate solution, hydrochloric acid, zinc ammonium chloride flux, molten zinc, hydraulic oil, alcohol base ink, and raw and waste inks and solvents (Ref. 13, pp. 17–19). Surface-water runoff from the facility entered the Ohio River (Ref. 13, pp. 4, 14, 22). The reconstructing of the domestic steel industry in the 1970s and 1980s resulted in a gradual downsizing of operations (Ref. 13, p. 8).

2.3.2. 4K Industrial Park

As mentioned in Section 2.2, in 2012, 4K Industrial Park, LLC purchased a portion of the land—at 1001 Main Street, Martins Ferry, Ohio—under an order of the United States Bankruptcy Court for the District of Delaware in connection with the WP Steel Venture LLC, RG Steel LLC bankruptcy, Case 12-1161. Subsequent site operations included commercial leasing and operation of the WWTP to treat "brine" as defined in Ohio Revised Code 1509.01 under an authorization issued by ODNR (Ref. 11, pp. 1, 6, 7).

On December 23, 2013, 4K Industrial Park, LLC applied to the ODNR Division of Oil and Gas Resources Management (DOGRM) requesting to operate a brine water recycling and treatment facility. On January 3, 2014, DOGRM issued 4K Industrial Park, LLC temporary authorization to operate such a facility—namely, the existing WWTP. The WWTP recycled and treated hydraulic frac waters and drilling fluids. The treated water was recycled back to the drilling companies for reuse (Ref. 60, p. 1).

On May 9, 2014, 4K Industrial Park, LLC received NPDES Permit OH0011339, which authorized WWTP discharge, although no wastewater was discharged. Later, on December 10, 2018, 4K Industrial Park, LLC received a "no exposure" certificate for exclusion from industrial NPDES stormwater permitting by the Ohio Environmental Protection Agency (Ohio EPA) (Ref. 11, pp. 12, 69).

The permit for the operation of the WWTP states that 4K Industrial Park, LLC proposed to operate a brine water recycling treatment facility utilizing the existing WWTP for use in recycling and treating hydraulic frac waters and drilling fluids. Treatment was to be performed on site, and the water was recycled back to drilling companies for reuse (Ref. 11, pp. 12, 49). The WWTP operated from 2016 through 2018 and was maintained in operational condition; it could be restarted to treat brine when market conditions warranted (Ref. 11, pp. 1, 6, 7).

On October 31, 2018, Ohio EPA prepared a letter that stated that—at the time of an inspection on October 2, 2018—steelmaking operations had been removed from the facility and the WWTP had been converted to treat oil and gas brine. The letter noted that previously permitted operations contributing to generation of process wastewater no longer existed and that the WWTP no longer discharged from Outfall 001 (Refs. 10, p. 9; 64, p. 1). The WWTP was permitted to discharge to Outfall 001 on June 28, 2004 (Ref. 38, p. 1).

4K Industrial Park, LLC withdrew water from the Ohio River in 2018 (Ref. 11, p. 7). Per the permit, this water use was for oil and gas (hydraulic fracturing) in the amount of three million gallons per day from one surface-water intake (Ref. 11, p. 46).

From October through December 2021, 4K Industrial Park, LLC generated and disposed of hazardous waste using RCRA Permit OHD010448231, which included Wastes D002, D007, and D008 (primarily, sodium hydroxide, hydrochloric acid, and phosphoric acid—the waste manifests are only partially legible) (Refs. 10, p. 8; 11, pp. 8, 53–64). The WWTP generated this hazardous waste, which was characterized before proper disposal. Currently, 4K Industrial Park, LLC does not store or use any hazardous substances (Ref. 11, p. 8). Contamination prior to 4K Industrial Park, LLC operations are being addressed under the EPA RCRA corrective action program (Ref. 10, p. 1; Appendix B).

2.3.3. Austin Master Services

Since October 27, 2014, 4K Industrial Park, LLC has leased space at the industrial park to AMS, specifically Buildings 255 and 256 along with a parking lot and 7.3 acres of unimproved land at the site (Appendix A, Figure 2) (Ref. 11, p. 7). AMS was incorporated in Pennsylvania on August 17, 2010, and it was authorized

to conduct business in Ohio on August 7, 2014 (Ref. 10, p. 9). At the site, AMS processes Marcellus and Utica shale fracking waste, which contains uranium, thorium, and radium (Ref. 10, p. 8). The AMS facility was permitted by the Ohio Department of Health (ODH) Bureau of Environmental Health and Radiation Protection (BEHRP) and DOGRM. Ohio EPA regulates fugitive air emissions from the facility.

The transportation of materials to AMS is not regulated by ODNR, DOGRM, ODH, or Ohio EPA. CORR representatives observed releases of liquid from trucks entering the AMS facility, which could potentially result in the contamination of soil on and off site. Additionally, tracks from trucks exiting the interior of the facility were observed during an inspection (Refs. 6, p. 1; 27, p. 1; 28, p. 1; 30, p. 1). The transportation of materials to and from AMS would be regulated by transportation authorities with jurisdiction at the location of material, such as a Department of Transportation or Federal Railroad Administration. Department of Transportation regulators are generally handled by the State Patrol. The Nuclear Regulatory Commission (NRC) also has radiation transportation regulations; however, NRC regulations apply to higher level radiation wastes, and NRC does not regulate diffuse technologically enhanced naturally occurring radioactive material (TENORM) (Ref. 72).

2.3.3.1 Ohio Department of Health

AMS received a license for radioactive material, License 0321907000, on February 26, 2019 from ODH that expires on February 1, 2024 (Ref. 19). AMS may possess radioactive materials that include TENORM radionuclides (including radium and uranium) in solid waste as well as special nuclear materials (SNM). Because AMS is a service provider, a condition for SNM applies: the license is only applicable when AMS is at temporary jobsites packaging and removing sources for clients if they encounter SNM. AMS does not (or is not expected) to have quantities of SNM at their facility. The license also details the following allowed activities:

- The processing, storage, packaging, and shipment of radioactive material incident to the surface decontamination of structures, components, and items for unrestricted release
- Surveys, characterization, and remediation of radioactive contaminated structures, materials, soils, and soil-like material
- The receipt, decay in storage, and/or transloading of solid wastes containing isotope tracer units in any combination
- The receipt, shipment, and radiological analysis of containerized TENORM solid waste
- The receipt and direct transloading into Gondola cars of non-oil and gas TENORM containerized solid waste for transport to an out-of-state disposal facility authorized to receive radioactive waste

- Transport of waste materials—containing radionuclides and loaded into Gondola cars—to an out-of-state disposal facility (AMS is not permitted to open any waste containers prior to the waste being loaded into Gondola cars for disposal) (Ref. 19)

The permit further states that AMS may conduct radiological analyses of containerized TENORM solid waste in accordance with the AMS–Ohio TENORN procedure—Number RP-AMS-078, Revision 3—dated January 26, 2019 (19, p. 3). ODH inspection reports state that AMS uses a small laboratory within Building 256 for radiation monitoring required for health, safety, and waste management. The company uses meters capable of detecting radiation, such as a Geiger counter. Within Building 256, AMS may process TENORM from the oil and gas wells under the authority of the DOGRM. ODH has authority over TENORM derived from non-ODNR oversight and implementation of the radiation safety program. All radioactive sealed sources secured within the laboratory are exempt from the ODH license. The remainder of the facility consists of offices, temporary storage areas, and equipment support areas with low-level radioactive material (Ref. 10, p. 9).

EPA defines TENORM as "naturally occurring radioactive materials that have been concentrated or exposed to the accessible environment as a result of human activities such as manufacturing, mineral extraction, or water processing." "Technologically enhanced" indicates that the radiological, physical, and chemical properties of the radioactive material have been concentrated or further altered by having been processed, beneficiated, or disturbed in a way that increases the potential for human and/or environmental exposures. "Naturally occurring radioactive material" (NORM) is defined as "materials which may contain any of the primordial radionuclides or radioactive elements as they occur in nature, such as radium, uranium, thorium, potassium, and their radioactive decay products, such as radium and radon, that are undisturbed as a result of human activities" (Ref. 16, p. 1). Radioactive elements are present in most soils and rock formations and, consequently, in the water that contacts these formations. The extraction and processing of these resources may expose or concentrate NORMs, causing them to be classified as TENORMs, which is common in oil and gas production wastes (Ref. 16, p. 2).

ODH defines TENORM as naturally occurring radioactive material whose radionuclide concentrations are increased by or a result of past or present human practices. TENORM does not include drill cuttings or natural background radiation (Ref. 70). The Ohio definition follows that of the Council of Radiation Control Program Directors (CRCPD) Part N definition that is limited to increased concentrations. If the concentrations are not increased (for example, by drill cuttings), then the material is considered NORM in Ohio and not regulated (Ref. 71).

2.3.3.2 Division of Oil and Gas Resources Management

START obtained information regarding the operations of the AMS facility from DOGRM's response to a permit application submitted by AMS on October 24, 2014 to operate an oil and gas production waste processing facility within Buildings 255 and 256. The response included a copy of the application that identified AMS as the applicant and stated that the purpose of the facility was for the storage, processing, and disposal of drilling mud, drill cuttings, and all exploration- and production-generated TENORM (Refs. 19; 20, p. 1).

DOGRM Chief's Order 2014-541, issued on November 26, 2014, authorized the receipt and processing of liquid, suspension, and solid oil and gas waste substances at the AMS facility. Authorized activities included: (1) the transfer of containers delivered to the facility by truck to rail cars for eventual transport to disposal facilities outside Ohio; (2) the stabilization of materials using cement kiln dust and/or approved stabilization agents to reduce the amount of free liquid in the container; (3) the mixing of materials to reduce the overall radiological concentrations in the resulting mixture; (4) the packaging of mixed materials and the loading of packages for disposal transport at Ohio landfills, provided that the material meets Ohio EPA acceptance criteria for landfill disposal; (5) pressure washing, tank cleaning, and decontamination; and (6) containerized waste storage. The AMS radiation protection program-plan received approval for implementation on January 8, 2019 (Ref. 61, p. 2).

On February 12, 2019, DOGRM conducted an initial routine inspection of the implementation of the AMS radiation protection program-plan. The inspection found that the public dose and environmental monitoring were not specifically addressed. During the field inspection, an AMS representative indicated that public dose was monitored by thermoluminescent dosimeters (TLDs) placed outside the process building. These TLDs were absent during the inspection. During the exit meeting, the AMS contractor radiation safety officer provided statements regarding the commencement of airborne radioactivity monitoring (air sampling) in certain process building areas as well as environmental air monitoring to evaluate levels outside processing areas. DOGRM and AMS agreed to revisit the subject of environmental air monitoring following an analysis of data from several months of air sampling inside the process building (Ref. 61, p. 3).

Overall, the inspection proposed actions to address items of non-compliance or observations of concern:

- Reposition the process building area TLDs to better assess potential worker exposure
- Install area TLDs outside radiologically restricted areas to demonstrate compliance with public dose requirements
- Commit to providing job-specific training and recordkeeping requirements to the technician staff

- Add dose rate survey data for all waste shipments leaving the AMS facility to the current waste management Excel spreadsheet
- Update the generic AMS standard operating procedures (SOPs) to reflect AMS-specific conditions
- Post notices identifying all radiological restricted areas
- Implement radiological air monitoring inside the process building
- Reassess the issue of environmental air monitoring once several months of air sampling results from inside the process building have been collected (Ref. 61, p. 4)

DOGRM conducted a second radiation protection program inspection on January 7, 2020. The inspector had one observation of concern: access control to the radiologically posted processing building. The inspector observed an employee (a trained "radworker") exiting the posted area without conducting a personal survey as well as a truck driver (a member of the general public) entering and exiting the posted area unabated (Ref. 62, p. 1). DOGRM also observed installed TDLs as required by the permit to monitor public dose and the environmental (Ref. 62, p. 4).

A detailed description of the AMS layout and operations is provided in the AMS permit application (Ref. 20). Wastes are staged at the northeastern end of the warehouse, then dumped into the half round inside a pit in the back of the warehouse. Wastes are then run through agitators and a filter press. High radioactive solid wastes are shipped to Utah, and lower-level solid wastes are shipped to Pennsylvania. Liquids are shipped to a Class II injection well, and radioactive wastes are "down blended" with "drill sands" that arrive at or around background radiation levels (Ref. 25, p. 9).

2.3.3.3 Ohio Environmental Protection Agency

AMS failed to obtain a permit to install and operate the material handling operations that began in 2015 (Ref. 18, p. 2); however, on June 7, 2022, Ohio EPA gave AMS an air pollution permit for installation and operation (Facility Identification 0607095013, Permit P0131425 for initial installation). The permit allows AMS to install, modify, and/or operate emission units (Ref. 17, p. 1). The emission units include Unit F002 (Equipment P002) and Unit F005 (equipment waste storage piles). Unit F002 (waste material transfer points) is for waste material handling with a potential annual throughput of 1,752,000 tons (Ref. 17, p. 18); Unit F005 is for the waste material storage piles with a size of 0.1 acre (Ref. 17, p. 22). The permit outlines emissions limits and control requirements as well as monitoring, reporting, and testing requirements (Ref. 17, p. 1).

2.4. PREVIOUS INVESTIGATIONS

The following sections summarize investigations conducted at the site.

2.4.1. 2008 Preliminary Assessment Visual Site Inspection

In 2008, Booz Allen Hamilton conducted a preliminary assessment/visual site inspection (PA/VSI) for EPA as part of RCRA corrective action support for the WPSC Martins Ferry Plant. The company identified 35 solid waste management units (SWMUs) and 6 areas of concern (AOCs) (Ref. 12, p. 11–35). Attachment 1 includes an excerpt from the PA/VSI, including a list of the SWMUs and AOCs, a figure showing the layout of the facility, and a figure showing the locations of the SWMUs and AOCs. In 2022, Toeroek Associates, Inc. completed a historical investigation summary report for WPSC that includes the most recent summary of all the SWMUs and AOCs identified in the 2008 PA/VSI, including completed actions and potential outstanding issues (Attachment 2). Because the RCRA Corrective Action Program has initiated correspondence with 4K Industrial Park, LLC regarding an environmental investigation and complete any necessary remediation, these possible sources of contamination are not evaluated as part of this PA.

2.4.2. 2010 Phase I Property Assessment Report

In 2010, Civil & Environmental Consultants, Inc. completed a Phase I property assessment (Phase I) of the Severstal North America, Inc. facility at the site. The purpose of the Phase I was to assess the steel manufacturing plant under Ohio Voluntary Action Program Phase I requirements as set forth in Ohio Administrative Code (OAC) 3745-300-06. According to the assessment, during the operation of the facility, releases to the surface and the ground surface occurred and included the release of oil, acid, alkali, and chromate solutions, specifically at the former drum storage area and oil storage shed (Ref. 13, pp. 1, 13). The assessor observed the improper storage of materials during site inspections in the galvanizing line batch tanks, the overhead acid tanks, the overhead zinc ammonium chloride tank near the baghouse dust collector, and the container storage/handing areas. Releases from these areas will be addressed under the RCRA Corrective Action Program (Ref. 13, pp. 13, 14).

The Phase I also identified several NPDES ODH violations for the release of acid and alkali liquid, zinc, and oil and grease (Ref. 13, pp. 14, 15). Wastes generated by the plant were stored until disposed off-site. The plant held a Title V air emission control permit, issued on July 20, 2005, that covered emission from the bag house dust collector for zinc ammonium chloride flux and fugitive dust emissions from the facility's roadways (Ref. 13, p. 15).

The Phase I also documented that the facility had four underground storage tanks that were removed between 1996 and 2009. It noted subsurface soil and groundwater contamination for two of these four tanks as well as 22 monitoring wells that were subsequently installed to characterize and monitor the extent of groundwater contamination. The contaminated soil and groundwater were remediated under the Ohio Bureau of Underground Storage Tank Regulations (BUSTR) program, and a "no future action" notice was issued on July 10, 2009 under the program (Ref. 13, p. 17).

Three oil/gas wells were at the plant; one has since been decommissioned (Refs. 13, p. 17). The locations of the wells are not identified in reference documentation, and it is unknown if an oil/gas wells is active on the site. The plan also had equipment containing polychlorinated biphenyl (PCB) that was removed and replaced with non-PCB containing equipment (Ref. 13, p. 31).

At the time of the Phase I, the following were not in operation:

- The 36-, 48-, and 60-inch galvanizing lines and corresponding product branding process
- The temper mill

The following continued to operate:

- The roof shop operated by Wheeling Corrugated Company
- The machine shop
- The maintenance/electrical shop
- The boiler house
- The paint shop
- The WWTP (Ref. 13, p. 12)

The Phase I report did not provide descriptions of the operations in each of these areas.

2.4.3. 2013 Soil and Groundwater Investigation

In preparation for the purchase of a portion of the site, Ohio River Partners, LLC (ORP) conducted soil and groundwater sampling as part of its environmental due diligence. ORP collected 10 soil samples from the site, including two samples from five locations: one at the surface and another up to 35 feet below ground surface (bgs). Additionally, ORP collected seven groundwater samples. The company analyzed all samples for volatile organic compounds (VOCs) and metals; two soil and groundwater samples were also analyzed for polyaromatic hydrocarbons (Ref. 32, p. 2).

There was dissolved cadmium—at concentrations ranging from 13.6 to 89.8 micrograms per liter (µg/L)—in four of the seven groundwater samples. The concentrations are above the EPA cadmium maximum contaminant level (MCL) of 5 µg/L. During this investigation, no other concentrations of hazardous substances were detected in groundwater or soil samples above MCLs or Ohio Voluntary Action Program cleanup standards (Ref. 32, pp. 4–5).

2.4.4. 2015 to 2021 Groundwater Sampling

Groundwater samples collected between 2015 and 2021 were analyzed for radionuclides The concentrations of radionuclides detected in the groundwater samples are the measurement of gross alpha particle activities in groundwaters with alpha emitters having energies above 3.9 mega-electron volts. Alpha particles are emitted from some radionuclides—in other words, chemical elements with unstable atomic structures called "radioactive isotopes." There are more than 1,500 different radioactive isotopes; they are identified by a number after the element name. These unstable structures break down to release or emit radiation energy from the nucleus or other parts of the atom. Three types of radiation can be released: alpha particles, beta particles, and gamma rays (photons), but most naturally occurring radionuclides are alpha and beta particle emitters (such as uranium and radium-226) (Ref. 24, p. 1).

Most of the radionuclides found in drinking water sources are naturally occurring. Radionuclides usually enter drinking water through natural erosion and chemical weathering of mineral deposits. Mining may increase the levels of radioactive materials found in water (Ref. 24, p. 1). The MCL is the maximum allowable level of a contaminant that may be present in drinking water without a risk of causing health problems. The MCLs for radionuclides are: (1) 15 pCi/L for alpha particle emitters, excluding radon and uranium; (2) 5 pCi/L for combined radium-226/radium-228 isotopes; and (3) 30 µg/L for uranium (Refs. 23; 24, p. 1). Radionuclides are measured as pCi/L—related to the amount of radioactivity contained per minute in a liter of water, in millirem per year, for the ionizing radiation delivered to the body in a year—and µg/L for contaminant in a liter of water, equal to parts per billion (Ref. 24, p. 1).

Between September 2015 and September 2021, AMS collected 10 rounds of groundwater sampling from four monitoring wells near Buildings 255 and 256 for a total of 10 sets of groundwater samples. The samples were analyzed for target compound list (TCL) VOCs, total and dissolved metals, general chemistry, and radiological conditions (Ref. 22, pp. 2–6). There was no background groundwater sample, so concentrations above background levels could not be identified. The monitoring wells are shown in Figure 2 of Appendix A.

The highest concentrations of analytes were in samples from Monitoring Well NE, which is adjacent to the Ohio River and hydraulically downgradient of the site, including the buildings in which AMS operates (Ref. 22, p. 6). Numerous analyte concentrations, including gross alpha concentrations, exceed EPA's primary drinking water standard MCL established under the Safe Drinking Water Act. Radium-226 and - 228 were not detected above MCLs between September 2015 and September 2021 (Refs. 22; 23). The alpha concentrations change significantly over time; however, the changes do not show a consistent increase or decrease (Ref. 23, pp. 2 to 6).

Additionally, from April through June 2015, Allegheny Environmental Services conducted a groundwater investigation at the site for 4K Industrial Park, LLC to evaluate groundwater quality conditions of the facility prior to startup (Ref. 11, p. 126). The date on which 4K Industrial Park, LLC began treating brine is not in the site files. Inspection reports note that the facility was not operational on April 12, 2017 and that the facility received "flowback water for processing" (Ref. 15, pp. 12–13).

The AMS facility began operations in October 2014, prior to the groundwater investigation. The 2015 groundwater investigation included the installation of three groundwater monitoring wells within the unconsolidated sediments of the Ohio River. Allegheny Environmental Services sampled the wells for Ohio EPA Division of Drinking and Groundwater parameters, including general chemistry, VOCs, metals, and radiological parameters. On April 15, 2015, concentrations above MCLs present in Monitoring Wells 4K- 2 and 4K-3, with concentrations of 2,280 picocuries per liter (pCi/L) and 26.3 pCi/L of gross alpha, respectively, with respect to the MCL of 15 pCi/L. Additionally, radium-228 was present in levels above the MCL of 5 pCi/L in each of three monitoring wells sampled, at concentrations of 10, 8.72, and 20.9 pCi/L (Refs. 10, pp. 22, 23; 11, pp. 126–132; 23). The monitoring well locations are shown in Figure 3 of Appendix A.

2.4.5. 4K Industrial Park Site Inspections

From 2015 to 2020, DOGRM conducted quarterly site inspections of the 4K Industrial Park, which included a tour of the facility; Table B-3 of Appendix B summarizes these inspections. The inspections included interviewing site personnel and taking photographs. Not all the photographs are in the reports, but all are on file. Diagrams of the operations, design plan, and site layout plan were not in the site files available for review (Ref. 15).

2.4.6. Austin Master Services DOGRM Inspections

From 2015 to 2022, DOGRM completed quarterly inspections for the AMS facility at 801 North Fourth Street, Martins Ferry, Belmont, Ohio. Not all inspection reports were available for review. Tables B-4 and B-5 of Appendix B summarize the observations and recommendations in the available inspection reports.

2.4.7. Austin Master ODH Inspections

ODH conducted inspections of the AMS facility One ODH inspection report, dated November 9, 2017, describes AMS's operating facilities as follows:

> The area of use is a small laboratory within a large concrete building. Within the large concrete building, the licensee is permitted to process TENORM [Technologically Enhanced Naturally Occurring Radioactive Material], from the oil and gas wells under the jurisdiction of The Ohio Department of Natural Resources (ODNR)-Division of Oil and Gas Resources Management. The Ohio Department of Health (ODH) has jurisdiction of TENORM material derived from non-ODNR oversight and implementation of the radiation safety program. All radioactive sealed sources (exempt) were secured within the laboratory. The remainder of the facility consists of offices, low level radioactive materials temporary storage areas and equipment support areas (Ref. 10, p. 9).

The inspection report also notes that a representative of AMS stated that licensable material was unsealed from incoming transportation containers; the waste was deposited on the floor and "repackaged" for transport into railcars. ODH informed AMS that placing waste on the floor for either repackaging or direct placement of non-containerized non-oil and gas NORM/TENORM waste into gondola cars is considered waste processing, which is outside the scope of a service provider's license (Refs. 10, p. 9). On November 20, 2017, AMS received a notice of violation for failure to limit activities to the authorized licensed purposes (Ref. 37). The ODH conducted a follow-up inspection on August 2, 2018 to determine if AMS was still in violation of the notice issued on November 20, 2017. The ODH found AMS to be in full compliance with Ohio regulations (Ref. 10, p. 17).

Later, on May 5, 2021, ODH conducted another inspection of the facility concerning AMS's radioactive materials license. The subsequent report indicates that AMS reported no incidents or events since the last inspection on August 2, 2018. Additionally, it indicates that five ODH-regulated material deliveries had been processed at the site for disposal. AMS informed ODH that the regulated material is disposed outside the state, not in any Ohio municipal landfills. Finally, the report states that ODH reviewed several recent radiological surveys—including dose rate and contamination surveys for transportation—and that no issues

with contamination control were indicated by the survey data for ODH-regulated material (Ref. 10, pp. 9, 10).

2.4.8. 2022 Petition Investigations

CORR sent a petition to EPA stating that, in July 2021, citizens obtained inspection reports from 4K Industrial Park, LLC and AMS indicating issues that appeared to be ongoing at the site, including: (1) improper containment; (2) water and waste being tracked around the facility and exiting the building; (3) leaking tanks; and (4) a leaking roof. In response, the citizens collected samples of the surface soil near the facility and had them tested at a certified laboratory. According to the petition, radiation in the soil was over 10 times the background level and nearly triple the upper limit for Superfund site cleanup status (Ref. 6, p. 1). The letter then stated that groundwater could be contaminated with radioactive materials and heavy metals from the previous steel manufacturing conducted at the site. The citizens were also concerned that the contamination could be moving within the aquifer underlying the site (Ref. 6, p. 1).

Later, in April 2022, CORR submitted a PA petition to Ms. Monica Onyszko—Corrective Action Project Manager, EPA, Region 5—and copied Debra Shore (Regional Administrator, EPA, Region 5), Francisco Arcaute (Community Involvement Coordinator, EPA, Region 5), and Michael S. Regan (EPA Administrator). The petition provided links to soil and groundwater analytical reports voluntarily submitted by AMS on January 18, 2022 to Ohio EPA. The petition expressed concerns about the potential for groundwater contamination posed by AMS from the processing of oil- and gas-industry waste at its facility (Ref. 5, p. 1). The petition referred to AMS groundwater analytical data and results of an investigation conducted by CORR to evaluate concentrations of radium-226 and other radioisotopes in proximity to the facility through the collection of soil samples (Refs. 22, p. 1; 26, p. 11).

Additionally, on May 25, 2022, CORR sent a letter to ODH stating concerns from Martins Ferry residents regarding soil radiation levels exceeding federal and state regulations near the AMS oil and gas waste processing facility. The letter states that the radiation could have come from the mishandling of oil and gas waste transported to and from the waste facility building. It further states that ODNR—Ohio's sole and exclusive regulatory authority on oil and gas waste—told the people of Martins Ferry that no action is warranted under their agency. The letter summarized subsequent investigations taken by CORR:

> Concerned Ohio River Residents (CORR) and their team of scientists have revealed the soil sample results to the public and the state and federal agencies showing elevated levels of radium 226 (levels in excess of 10X's background level for radium 226) and other radioisotopes on the public road. The federal regulatory

> limit for radium 226 is 5 picocuries/gram over background level. The levels CORR found through sampling were over double the federal limit. Airborne particles containing radioactive materials pose immediate health threats through inhalation. Considering the high solubility of these radioisotopes, risk to source water contamination is high and warrants appropriate action to fully characterize the fate and transport of both the radiological and chemical contaminants in the subsurface. Compounding the issue is the fact that the Ohio EPA also told CORR in an email dated March 22nd, 2022, that there are 4 monitoring water wells on the site owned by AMS and those wells showed elevated levels of alpha particles already within the groundwater. Ohio EPA (OEPA) stated they sent those results on to ODH since radionuclides are outside Ohio EPA's authority (Ref. 27, p. 1).

The letter conveyed that ODNR had informed CORR that it is the responsibility of ODH to deal with radioactivity within the public domain. Additionally, ODH was scheduled to conduct sampling regarding AMS, and CORR requested that they be given permission to accompany ODH while sampling (Ref. 27, p. 2).

As a follow-up, on July 7, 2022, CORR emailed numerous EPA Region 5 personnel the: (1) analytical results from a soil sample taken from a worker's boots; (2) a link to a video of readings taken using a Ludlum 3000 radiation meter on the worker's boots; (3) a link to images from workers at AMS; (4) a photograph of the boot and hard hat where Ludlum readings were taken; and (5) a link to a video showing dust from trucks entering and leaving AMS, where soil samples were collected (Ref. 28, p. 1). The soil sample taken from the boot had concentrations of bismuth-214 (80.41 pCi/g), lead-214 (80.77 pCi/g), and radium-226 (80.41 pCi/g) (Ref. 28, p. 4). Additionally, two images show a worker in a confined space covered in sludge with no respiratory protection (Ref. 29, pp. 48, 75).

On July 11, 2022, CORR, Buckeye Environmental Network, and other Ohio community members and environmental organizations sent a letter to Michael Regan—Administrator, EPA Headquarters—and Cynthia Ferguson—Acting Director, U.S. Department of Justice—summarizing CORR's investigations and requesting intervention to protect the community surrounding the AMS facility. The letter stated the following:

> AMS handles solid and liquid radioactive waste from the oil and gas industry and other industries. We have identified environmental justice and human rights abuse under President Biden's Executive Order 13985. Understanding your values and heavy emphasis on pushing for environmental justice, we call upon the United States Environmental Protection Agency to address disproportionately high and adverse health and environmental impacts on low-income populations here in Appalachia (Ref. 30, p. 1).

The letter also noted that inspections by ODNR and photographs in the agency inspection reports show a disorganized and potentially hazardous work environment with radioactive sludge being spread throughout the facility. The letter noted that trucks entering and leaving the building have tracked sludge and other waste from the facility on their tires, and this waste could be tracked throughout the community. CORR noted that the waste contains radium-226, which has a half-life of 1,600 years (Ref. 30, p. 1).

Furthermore, regarding AMS employees and their safety, CORR's letter stated the following:

> Workers at AMS are formerly incarcerated individuals in need of employment or face being reincarcerated. These workers may be willing to do things, so they do not lose their jobs. Workers are not told that they are dealing with radioactive material. They do not appear to wear breathing apparatuses while working within the building. ODNR's photographs show a grim picture of the facility with filter socks piling up and radioactive sludge everywhere. A former AMS employee allowed the citizen's group to test their work garments (hard hats and boots). The testing of these garments has shown them to be radioactive (Ref. 30, pp. 1, 2).

Debra Shore responded to the letter, stating that EPA is committed to taking all action within its authorities to investigate CORR's concerns and advance environmental justice. She noted that EPA Region 5's Superfund and Emergency Management Division (SEMD) will conduct a CERCLA PA at the site in response to the petition received on April 4, 2022. EPA plans to complete this investigation by April 4, 2023 and will determine whether the site is appropriate for further evaluation by the Superfund program (Ref. 31, p. 1).

2.4.9. 2022 Ohio EPA Response to Verified Complaint

On August 8, 2022, Ohio EPA responded to a verified complaint from a CORR representative. The complaint alleged that AMS operations at 801 North 1st Street, Martins Ferry in Belmont County, Ohio was in violation of the Ohio Revised Code (ORC), OAC rules, and Sections 311 and 312 of the Emergency Planning and Community Right-to-Know Act, found in Title 40 of the *Code of Federal Regulations* (40 CFR) Part 370. The complaint pertained to the observation of fugitive dust from AMS's facility, which was not verified during Ohio EPA on-site inspections. It also cited dust from the roadways and parking areas, though the dust meets the de minimis exemption (less than 10 pounds per day) provided by OAC Rule 3745-15-05(B) and does not require air permits. The verification letter prepared by Ohio EPA in response to a complaint stated that the AMS needs a permit for the material handling emission unit at the facility because AMS handles TENORM; AMS failed to obtain a permit to install and operate for its material

handling operations, which began in 2015. On February 25, 2022, Ohio EPA issued a notice of violation citing AMS's failure to obtain this permit for its operations (Ref. 18, pp. 1, 2).

The CORR complaint stated that the AMS facility did not have proper stormwater permits; however, oil and gas services are exempt from NPDES coverage (Ref. 18, p. 2). The Ohio EPA verification letter noted that Ohio EPA inspected the facility on both October 8, 2021 and June 1, 2022 and found no violations related to releases; the inspections also failed to find industrial or other wastes being tracked outside the AMS facility. In fact, during the October 2021 inspections specifically, Ohio EPA found that AMS washes dirty trucks as part of good housekeeping efforts and had plugged two interior ditches and a sump associated with the three side-by-side doors into the facility before operation. The area outside the four main doors leading into the facility is also monitored and cleaned regularly (Ref. 18, p. 3).

2.4.10. Concerned Ohio River Residents Worker Personnel Protection

As discussed in Section 2.4.9, on April 12, 2022, CORR collected a soil sample from an AMS worker's boot for an analysis of radium-226 and other radioisotopes using the EPA 901.1 modified method (Ref. 28, p. 3); results are provided in Table 1. In February 2022, CORR also collected two background soil samples: one from a community park and another from a cemetery; the locations are shown in Reference 33, page 6, and the analytical results for the background concentrations are provided in Table 3 of this PA report. The background concentrations from Table 3 are used for comparison, and concentrations above background levels are shaded in Table 1 (Ref. 9). The concentrations of the isotopes detected in soil sample collected from worker's boot are compared to the total calculated preliminary remediation goals (PRGs) for radionuclides using a cancer target risk of 1E-04 for indoor workers. PRGs are part of the EPA HRS criteria used in START's PA to assess the threat of actual or potential releases of hazardous substances from the site.

The concentrations of the isotopes detected in the soil sample collected from the worker's boot that are potentially attributable to the site—the radium isotopes—are also compared to calculated PRGs using a cancer target risk of 1E-04 for indoor workers for three individual exposure routes: ingestion, inhalation, and external exposure. The PRGs are summarized in Table 2. The radium-226 and radium-228 concentrations in the soil sample from the worker boot (Table 1) do not exceed any of the three PRGs for worker indoor exposure routes (Ref. 34).

TABLE 1 — SOIL SAMPLE RESULTS FROM WORKER APPAREL

Analyte	Two Standard Deviations Above Mean Background Concentrations (AMS-1; AMS-7) (picocuries per gram)	Soil from Workers Boot (picocuries per gram)	PRG 1E-04: Indoor Worker (picocuries per gram)
Actinium-228	2.6100	8.86	10.8
Bismuth-214	2.3950	**80.41**	5.96
Cesium-134	0.5450	0.13	6.16
Cesium-137	0.9500	-0.08	8,930
Potassium-40	6.6900	7.55	54.7
Lead-210	15.6600	9.17	520
Lead-212	3.1550	6.76	87.9
Lead-214	1.8100	**80.77**	44.1
Radium-226	1.8550	80.41	659
Radium-228	2.4150	8.86	469
Thorium-234	7.4550	13.57	2,300
Thallium-208	2.3500	**3.87**	2.5

Notes:

- Source: Reference 28, pages 3, 4
- Shaded cells denote concentrations two standard deviations above the mean of the three background soil samples.
- Numbers in bold exceed the total preliminary remedial goals (PRG) for 1E-04 for indoor workers (Preliminary Remedial Goals Calculator) (Ref. 34).
- AMS: Austin Master Services, LLC
- AMS-1 and AMS-7 are background sampling locations.

TABLE 2 — PRELIMINARY REMEDIATION GOALS (PRG) – INDOOR WORKER

Indoor Worker Exposure Route	PRG: Radium-226 (picocurie per gram)	PRG: Radium-228 (picocurie per gram)
Ingestion	1.09E+3	4.78E+2
Inhalation	3.86E+4	2.49E+4
External Exposure	1.75E+3	1.29E+6
Total	6.59E+2	4.69E+2

Source: Reference 34; Preliminary Remedial Goals Calculator

The PRGs are risk-based concentrations for the Superfund/RCRA programs determined from standardized equations combining exposure information assumptions with toxicity data. The calculation used to derive the PRGs includes default exposure parameters that present reasonable maximum exposure conditions (Ref. 34, p. 2). EPA considers the PRGs to be protective for humans (including sensitive groups) over a lifetime; however, PRGs are not always applicable to a particular site and do not address non-human health endpoints, such as ecological impacts. The calculated PRGs are generic (Ref. 34, p. 5) and apply to site "screening" and as initial cleanup goals; they are not de facto cleanup standards and should not be applied as such. Their role is to help identify areas, contaminants, and conditions that do not require further federal attention at a particular site. This does not mean that chemical concentrations above a PRG automatically designate a site as "dirty" or trigger a response action; rather, exceeding a PRG suggests that further evaluation is appropriate for the potential excess lifetime cancer risk that may be posed by site contaminants (Ref. 34, p. 6).

2.4.11. February 2022 Soil Investigation

CORR collected soil samples in February 2022 in the site area:

- Two background soil samples
- Two soil samples from a road in front of the AMS property
- One soil sample from the entrance of the AMS facility

Attachment 3—an excerpt from Reference 33, page 4—shows the sample locations. CORR analyzed the samples for radium-226 and other radioisotopes using the EPA 901.1 modified method (Ref. 33, p. 5); the results are provided in Table 3. The concentrations above background levels are shaded in gray in Table 3 and listed below:

- Actinium-228 at 2.95 pCi/g
- Bismuth-214 at 7.64, 13.12, and 14.14 pCi/g
- Cesium-134 at 4.17 pCi/g
- Lead-212 at 4.37 and 5.04 pCi/g
- Lead-214 at 9.03, 13.02, and 14.89 pCi/g
- Radium-226 at 7.64, 13.12, and 14.14 pCi/g
- Thorium-234 at 10.41, 9.68, and 15.54 pCi/g (Ref. 28, p. 2)

START applied HRS Rule Section 7.0 to identify concentrations above background for purposes of a PA. The rule states that a concentration of a radionuclide (radioisotope) is above background if the concentration equals or exceeds two standard deviations above the mean site-specific background concentration for that type of sample. The two background soil samples collected from the site were used to calculate the background concentration (Ref. 9).

TABLE 3 — FEBRUARY 2022 SOIL SAMPLE ANALYTICAL RESULTS

Analyte	Two Standard Deviations Above Mean Background Conc.	Soil Sample Identification and Location (picocuries per gram)					
		AMS-1 park (background)	AMS-7 cemetery (background)	AMS 2 road in front of AMS facility	AMS-3 southern end of large puddle on road in front of AMS facility	AMS-4 northern end of large puddle on road in front of AMS facility	AMS-5 and-6 150 feet from AMS facility main entrance
Actinium-228	2.6100	1.26	1.80	0.824	2.13	2.63	2.95
Bismuth-214	2.3950	1.07	1.60	3.76	7.64	13.12	14.14
Cesium-134	0.5450	-0.28	0.05	-0.047	0.01	-1.04	4.17
Cesium-137	0.9500	0.15	0.47	-0.117	0.00	0.24	0.16
Potassium-40	6.6900	15.67	12.48	4.43	5.55	7.86	4.34
Lead-210	15.6600	1.31	7.05	2.45	-0.60	0.24	-1.10
Lead-212	3.1550	1.28	2.03	0.969	3.01	4.37	5.04
Lead-214	1.8100	1.16	1.42	3.79	9.03	13.02	14.89
Radium-226	1.8550	1.07	1.60	3.76	7.64	13.12	14.14
Radium-228	2.4150	1.26	1.80	0.824	2.13	2.63	2.95
Thorium-234	7.4550	1.98	4.17	2.04	10.41	9.68	15.54
Thallium-208	2.3500	1.10	1.60	0.700	1.14	1.82	1.59

Notes:

- Source: References 26 (page 11) and 33 (pages 4–6)
- Shaded cell denotes concentrations two standard deviations above the mean of the three background soil samples.
- Conc.: Concentration
- AMS: Austin Masters Services, LLC
- AMS-5 and -6 are duplicate samples

2.4.12. 2022 Investigation of Alleged Radioactive Contamination

On June 8, 2022, the ODH BEHRP conducted scoping surveys at North 1st Street, Martins Ferry, Ohio and on a portion of the road owned by 4K Industrial Park, LLC leading to AMS's truck scales. The survey provided a preliminary hazard assessment of the area and delineated the extent of radioactive contamination in the defined area—North 1st Street from the entrance of National Lime and Stone to Avondale Avenue. An additional investigation was also conducted by BEHRP on the private road leading to AMS's truck scales (Ref. 35, p. 2).

BEHRP's survey consisted of in-situ gamma spectrometry, count rate measurements, and soil sampling. An industry standard gamma count rate screening criteria of twice background applied to this survey to mark areas for additional radiological data collection (Ref. 35, p. 2). The results verified that the gamma count rate screening criteria was adequate to identify elevated radionuclide activity concentrations and confirmed the accuracy of the in-situ isotopic analysis (Ref. 35, p. 3).

BEHRP took gamma count rate measurements on both the eastern and western berms of North 1st Street—starting from the entrance to National Lime and Stone and ending at Avondale Ave—and the eastern and western berms of the roadway leading to the truck scales. AMS and 4K Industrial Park, LLC both gave permission for site access. BEHRP analyzed gamma count rate surveys measuring twice the background level with the SAM-950 portable gamma spectroscopy instrument to determine isotopic content and gamma exposure rates. Soil samples were taken at the two locations with the highest activity in the alleger's report and three additional locations exceeding the screening criteria identified by the gamma count rate survey. The soil samples were submitted to an ODH laboratory for radiological analysis. Exposure rate measurements were taken at each sample location (Ref. 35, p. 4).

The gamma count rate surveys identified four localized areas that met or exceeded the twice-background screening criteria. Two of the areas were in the public domain on the western side of North 1st Street, and two areas were on the restricted access road leading to the truck scales. BEHRP took three soil samples on North 1st Street; their locations had the highest gamma count rate measurements and are therefore conservatively biased toward the highest concentration of radioactive material. Locations A and B on the survey report coincided with the alleger's Sampling Locations MWA-11 and AMS-5, respectively. The third sample was taken on North 1st Street at Location C. This location was not identified in the alleger's report but was found by BEHRP staff as exceeding the twice-background screening criteria (Ref. 35, p. 4).

Analytical results for soil samples at Locations A through C had low concentrations of radium-226 and radium- 228 (Ref. 35, p. 4).

Overall, BEHRP's survey confirmed that levels of radionucleotides were found in the public domain above background levels; however, BEHRP dose modeling shows that no detrimental health effects to the public are probable and that the dose to the public received by the material is below the regulatory limits in Ohio Administrative Code 3701:1-38-11(D)(4) and 3701:1-38-13(A) regulatory limit of 100 millirem per year (Ref. 35, p. 5).

2.4.13. 2022 RCRA Corrective Action

The EPA, Region 5 RCRA Corrective Action Program is currently engaged with 4K Industrial Park, LLC to pursue an environmental investigation at the site. The program has the authority to address hazardous waste remaining from historic releases at the site.

On January 11, 2022, as part of the investigation, EPA sent an information request to 4K Industrial Park, LLC seeking information about hazardous waste/constituent releases at the site and information about hazardous wastes that may be present—as the investigation also includes determination of the closure status of different historical solid waste management units and areas of concern at 4K Industrial Park (Ref. 11, p. 1). In its response to the information request, 4K Industrial Park, LLC did not provide any documentation related to these units (Ref. 11).

After reviewing 4K Industrial Park, LLC's response and additional information received about the site, EPA sent a letter on January 17, 2023 to 4K Industrial Park, LLC proposing that it conduct an environmental investigation and complete any necessary remediation. This discussion is ongoing.

3. SOURCE AND WASTE CHARACTERISTICS

The possible source identified at the site is soil contamination from the storage, use, and transfer of hazardous materials and waste. Hazardous waste contamination from historic operations will be addressed under the EPA RCRA Corrective Action Program and are not being considered in this PA at this time.

The possible source associated with the site is an area of surface soil contamination resulting from operations that occurred at the 4K Industrial Park Site. For the purposes of this PA, and due to the absence of significant soil sampling, the area of soil contamination is unknown but assumed to be greater than zero and suspected to be on site. The distances to target populations are measured from the facility boundaries.

There is the potential for hazardous substances to be released into soil, groundwater, and surface water during the storage, use, transportation, and treatment of hazardous wastes and products. From October through December of 2021, 4K Industrial Park, LLC generated and disposed of hazardous waste under RCRA Permit OHD010448231, which applied to D002, D007, and D008 (primarily sodium hydroxide, hydrochloric acid, and phosphoric acid—the waste manifests are only partially legible) (Refs. 10, p. 8; 11, pp. 53–64). The hazardous waste was generated from the operation of the WWTP and was characterized prior to being properly disposed in October, November, and December 2021. Currently, 4K Industrial Park, LLC does not store or use any hazardous substances (Ref. 11, p. 8).

Additionally, on October 27, 2014, AMS began processing Marcellus and Utica shale fracking waste, containing uranium and radium, at the site (Ref. 10, p. 8). AMS is authorized to receive, store, process, treat, and dispose of fracking waste, and approximately two trucks on average enter the site daily. The site has the capacity store up to 20,000 tons of material for a 30-day period. Material is stored in containers, and all solid waste is shipped by rail to Utah for disposal while liquid waste is disposed in injection wells in Pennsylvania. Radium-226 and -228 are associated with the AMS wastes (Refs. 10, pp. 8, 9; 20, pp. 4, 13). Furthermore, CORR representatives observed releases of liquid from trucks entering the AMS facility, which could result in the contamination of soil on and off site. Additionally, tracks from trucks exiting the interior of the facility have been observed during an inspection, which could contaminate soil and air (fugitive emissions) (Refs. 6, p. 1; 27, p. 1; 28, p. 1; 30, p. 1). Soil samples collected near the AMS facility contained radioisotopes above background levels, indicating that the facility may have released radioisotopes into soil (Refs. 26, pp. 14–17; 33, pp. 4–6).

Additionally, DOGRM's inspections of the 4K Industrial Park discovered the following containment issues:

- Standing water and debris in secondary containment
- Deteriorating secondary containment
- Frac tanks and vac boxes in areas with no containment
- Wastes stored directly on the floor of the warehouse with no containment and oilfield wastes tracked on the warehouse floor—thus creating the potential for radioactive and other wastes to be tracked out the warehouse by trucks entering the warehouse building
- Tracks from trucks exiting the interior of the facility
- Waste falling off trucks leaving the facility
- Waste on the floor of the loading area and at the entrance/exit to the warehouse building
- Waste tracked out the facility and onto the ground
- Corrosion at the base of some tanks
- No containment for oil/field wastes and dirty empty boxes
- A hole in the liner of northwest clarifier tank
- Water issues on the floor of the warehouse due to leaks in the roof (Refs. 15; 25)

4. MIGRATION AND EXPOSURE PATHWAYS AND TARGETS

4.1. GROUNDWATER MIGRATION PATHWAY

This section discusses the geologic and hydrogeologic setting, groundwater targets, and pathway conclusions drawn from known information about the site.

4.1.1. Geology and Hydrogeology

Belmont County is a part of the unglaciated Appalachian Plateau physiographic province, which is a broad dissected upland underlain by horizontal sedimentary rocks. The surface of the county is hilly (Ref. 40, p. 3). This county, located in the east–central part of Ohio on the Ohio River, has long been a producer of high-grade bituminous coal, mostly from the well-known Pittsburgh bed. The exposed strata of Belmont County, which covers an area of 535 square miles, were deposited during the Pennsylvanian and Permian periods in an uninterrupted sequence with an aggregate thickness of 1,100 feet. They consist of interbedded sheets of sandstone, siltstone, mudstone, clay, limestone, and coal comprising the upper 350 feet of the Conemaugh formation of the Middle Pennsylvanian Age, the Monongahela formation of the Middle and Late Pennsylvanian Age, and the lower 470 feet of the Dunkard Group, Washington, and Greene Formations (undifferentiated) of the Late Pennsylvanian and Early Permian Ages (Ref. 40, p. 1; 41; 42, p. 13).

The site is on the northwestern side of the Ohio River, which is within the lowest elevation of Belmont County, where the Ohio River is 615 feet above sea level. Along the Ohio River, the ridge tops are as much as 680 feet above river level. The site is underlain by unconsolidated sediments of variable thickness, including silt, sand, and fine gravel (Refs. 40, pp. 3, 7; 41). Three monitoring wells were installed on the site in 2015 within the unconsolidated sediments natural to the Ohio River Valley. The monitoring well logs identify unconsolidated sediments ranging from 5 feet to 45 feet bgs. Groundwater is encountered at 20 feet bgs (Ref. 11, pp. 133–137). The monitoring well logs show a typical soil layering sequence of clayey sandy silt overlying fine-to-medium silty sand. A consistent groundwater zone is in the sand layer. A surface layer of fill material is at Locations 4K-1 and 4K-2 on the 4K Industrial Park (Ref. 11, p. 126). The well locations are shown in Figure 3 of Appendix A.

In 2013, seven monitoring wells were installed in the northern section of the site as part of due diligence for a property transaction. The lithology encountered during drilling consisted of a surficial cinder fill layer underlain by tan-to-dark-brown sandy clay. Directly beneath this layer is 12 feet to 20 feet of inter-bedded

tan, sandy clay, and fined-grained sand lenses. Groundwater is encountered between 28 feet and 38 feet bgs (Ref. 32, p. 3). The locations of the monitoring wells are shown in Reference 32, page 10.

Underlying the unconsolidated sediments is the Pennsylvanian Age Conemaugh Group, which is composed of shale, siltstone, sandstone, mudstone, and lesser amounts of limestone and coal in shades of gray, green, red, brown, and black. The group has an estimated thickness of 350 feet to 490 feet, and its features include: (1) multicolored mudstones; (2) rare coal beds; (3) thin-to-thick marine shale and limestone in its lower two-thirds; and (4) rapid vertical and horizontal changes of rock types. Outcrops and subsurface data indicate that marine limestone beds are the most extensive units in the formation (Refs. 40, pp. 1, 6–9, 90; 41).

To the west of Martins Ferry at the surface is the Pennsylvanian Age Monongahela Group, which is composed of shale, siltstone, limestone, sandstone, and coal in shades of gray, green, and—infrequently—red with an estimated thickness of over 350 feet. Features include laterally extensive nonmarine limestone and economic coal beds (Ref. 40, pp. 17–19; 41). Coal beds are the most extensive of the various strata that occur in the Monongahela Formation (Ref. 40, p 1).

The only large-source aquifers in the area, and the county's primary groundwater sources, are sand and gravel deposits found in the floodplains along the Ohio River on the eastern side of Belmont County. These aquifers contain thick, permeable sand and gravel deposits that can yield substantial quantities of water. This valley's fill material ranges from 60 feet to 85 feet in thickness and is hydraulically connected to the Ohio River. The yield potential decreases drastically once outside the Ohio River floodplain because the county is underlain by interbedded sandstone, shale, and limestone formations. Most of the wells found in the interior of the county produce groundwater at rates of less than 2 gallons per minute (gpm) (Refs. 12 p. 8; 42, pp. 20–21, 40).

Groundwater in Belmont County is obtained from both unconsolidated (glacial–alluvial) and consolidated (bedrock) aquifers. Glacial aquifers are primarily limited to the terraces and floodplains flanking the Ohio River. Unconsolidated alluvial and lacustrine sediments are also found near the mouth of some of the larger tributaries of the Ohio River, including Wheeling Creek, McMahon Creek, and especially Captina Creek (Ref. 42, pp. 20–21).

Yields up to 500 gpm are obtainable from the coarse, well-sorted sand and gravel outwash deposits associated with the terraces flanking the Ohio River. Yields from the consolidated, bedrock aquifers throughout the county tend to be meager. They also typically tend to be especially poor along ridge tops, yielding less than 5 gpm for the entire county (Ref. 42, p. 21). In 2015, groundwater was encountered at 20

feet bgs in Monitoring Well 4K-1 at the site (Ref. 11, pp. 133–137); depths to groundwater of 5 feet to 15 feet are typical of the areas overlying floodplains immediately adjacent to the Ohio River (Ref. 42, p. 27). Net recharge is the precipitation that reaches the aquifer after evapotranspiration and runoff and is estimated to be 7 inches to 10 inches per year for terraces and floodplains flanking the Ohio River. These areas contain highly permeable soils, vadose, and aquifer materials, and they have shallow depths to water, gentle slopes, and surficial streams (Ref. 42, p. 27). For sand and gravel deposits along the margins of the Ohio River, hydraulic conductivities of 700–1,000 gallons per day per square foot (gpd/ft^2) and 300–700 gpd/ft^2 (Ref. 42, p. 31).

4.1.2. Groundwater Targets

The HRS evaluates threats to drinking water wells (groundwater targets) within a 4-mile radius TDL measured from edges of sources. The area surrounding the site is served by the Martins Ferry Water Department (Water System OH0701212). The source of water supply is groundwater received from eight wells at the north end of 1st Street, between the Ohio River and State Route 7 (Refs. 43, p. 1; 44; 45, pp. 4, 6, 33). The water department supplies drinking water to 6,980 customers as well as to other water district systems, including the Village of Bridgeport and the Tri-County Water Authority (Refs. 43, p. 1; 44, p. 1; 45, pp. 12, 31, 33, 37). The nearest municipal well is 150 feet east of the site (Appendix A, Figure 2; Ref. 10, p. 3). Four wells are within the 0.25-mile radius of the site, and another four are within the next 0.25-mile radius (Figure 4) as measured from the property boundary of the industrial park (Refs. 5, p. 5; 45, p. 5). The percentage of the total system's output supplied by each well was not publicly available. Routine water supply sampling (finished water) as required by Ohio EPA has identified the presence radium-228 below drinking water limits (per MCLs), thus meeting EPA Safe Water Drinking Act criteria (Refs. 21; 46). Martins Ferry tests for radium every three months (Ref. 59, p. 1).

Bridgeport Public Water Systems purchases all water from Martins Ferry Water Department. Bridgeport Public Water Systems serves approximately 2,900 people (Refs. 45, pp. 1, 4, 6, 31, 37; 47, p. 1). Tri-County Water Authority also purchases most of its supplies from the Martins Ferry Water Department. Tri-County Water Authority serves a population of 2,370 (Ref. 45, pp. 1, 37, 38; 49, p. 1). No other public drinking water supply wells were identified using the Ohio EPA Source Water Assessment and Protection Program, Drinking Water Source Area Project Maps Program (Ref. 47). The program does not address private residential well systems.

START verified public water supply systems in Belmont County via use of the EPA Enforcement and Compliance History Online (ECHO) quick search for drinking water systems. No violations—such as the presence of a hazardous substances, pollutants, or radioisotopes above MCLs—are reported for the water

systems (Ref. 47). Private drinking water wells could be within the 4-mile radius; however, this information is not publicly available. The number of possible private drinking water wells within the 4-mile TDL is expected to be low because the areas not served by public supplies are rural and have a low housing density.

Finally, a wellhead protection area is around the Martins Ferry Water Department's public supply wells. The wellhead protection area encompasses the northern section of the 4K Industrial Park's boundary (Ref. 45, p. 5).

4.1.3. Groundwater Conclusions

Between September 2015 and September 2021, AMS collected 10 rounds of groundwater sampling from four monitoring wells installed near AMS Buildings 255 and 256 for a total of 10 sets of groundwater samples. The highest concentrations of analytes were in samples collected from Monitoring Well NE, located adjacent to the Ohio River and hydraulically downgradient of the site, including the AMS facility (Appendix A, Figure 2; Ref. 22, p. 6). The monitoring well analytical results identified numerous analyte concentrations, including gross alpha concentrations, exceeding the EPA primary drinking water standard MCL established under the Safe Drinking Water Act, though radium-226 and -228 were not detected above MCLs (Refs. 22; 23). The most common radionuclides found in groundwater are decay products of naturally occurring uranium and thorium. Radionuclides usually enter groundwater through natural processes of chemical weathering and dissolution of minerals containing uranium and thorium or their daughter products. Average gross alpha values are generally low across Ohio; this is expected, because uranium and thorium are not concentrated within Ohio's major aquifers. Natural decay of uranium generates alpha radiation, and it is expected that lower levels of alpha radiation and radium will be found in groundwater associated with lower concentrations of these radioactive, parent elements. In Ohio, gross alpha levels are generally low, with few groundwater based public water systems exceeding the gross alpha MCL value of 15 pCi/L (Ref. 36, pp. 2, 3, 9).

Table 4 shows radiological MCL exceedances for Monitoring Wells AM-1, AM-2, AM-3, and NE between 2015 and 2021 (Appendix A, Figure 2; Ref. 22). No analytes have been detected at concentrations exceeding MCLs in the nearby Martins Ferry Water Department supply wells. There is no evidence of a release from the site to these supply wells.

TABLE 4 — GROUNDWATER GROSS ALPHA SAMPLE RESULTS EXCEEDING MCL

Groundwater Gross Alpha Sample Results Exceeding MCL of 15 Picocuries Per Liter				
Sampling Date	**Monitoring Well AM-1**	**Monitoring Well AM-2**	**Monitoring Well AM-3**	**Monitoring Well NE**
August 27, 2015	--	--	--	28
September 1, 2015	--	--	17.6	--
March 30, 2016	--	--	--	23.9
May 17, 2017	--	--	42.7	169
September 21, 2017	27.7	15.6	51	104
October 24, 2018	--	--	48.4	55.6
December 20, 2019	--	--	29.9	--

Notes:
- Source: Reference 22
- MCL: maximum contaminant level

Additional sampling events show that other concentrations above MCLs were detected in Monitoring Wells 4K-2 and 4K-3, namely concentrations of 2,280 pCi/L and 26.3 pCi/L of gross alpha, respectively, where the MCL is 15 pCi/L. This detection occurred before 4K Industrial Park, LLC operated the WWTP and after the AMS facility began operation. Finally, radium-228 was present at levels above the MCL of 5 pCi/L in each of three monitoring wells sampled at concentrations of 10, 8.72, and 20.9 pCi/L (Refs. 10, pp. 22, 23; 12, pp. 126–132; 23). There was no background groundwater sample, so concentrations above background cannot be determined; however, in Ohio, radium is generally low, with few public water systems exceeding the combined radium-226/radium-228 MCL value of 5 pCi/L. The widespread low levels in Ohio's groundwater suggest that the predominant sources of radium are from low concentrations of naturally occurring thorium and its daughter products (including radium and radon) within Ohio's geologic strata (Ref. 36, p. 1).

The area surrounding the site relies on groundwater for drinking water supplies and the drinking water wells 150 feet east of the site. Additionally, the aquifer underlying the site—comprised of unconsolidated sediments—is permeable and susceptible to contamination from any releases to the surface. There is evidence of historical surface soil contamination at the site from prior operations, and there is the potential for surface soil contamination from the 4K Industrial Park, LLC and AMS operations; therefore, there is the potential for the site to release to the groundwater migration pathway, threatening nearby drinking water supplies.

4.2. SURFACE WATER PATHWAY

This section discusses the hydrogeologic setting, surface water targets, and pathway conclusions drawn from known information about the site.

4.2.1. Hydrologic Setting

The area around the site is extensively characterized by tributaries leading to the Ohio River. The three main tributaries are Wheeling Creek (which drains the northeastern portion of the county, where the Martins Ferry WPSC facility is located), McMahon Creek, and Captain Creek. Some small streams also drain directly into the Ohio River (Ref. 40, pp. 3–5).

Historically, surface water runoff on the site property collected in a stormwater management system and discharged into the Ohio River in accordance with the NPDES permit issued by Ohio EPA. The WPSC facility held NPDES permits for five outfalls that discharged into the Ohio River:

- Outfall 001 discharges stormwater runoff from most heavily industrial portions of the facility, effluent from the on-site WWTP, process water, boiler blowdown, steam condensate, and non-contact cooling water.
- Outfalls 002 through 005 discharge stormwater from the facility into the Ohio River.
- Outfalls 003 through 005 discharge stormwater into the Belmont County storm sewers, which discharges to the Ohio River (12, p. 13; 14, p. 3).

Over time, sewers were plugged, and Outfalls 002, 003, 004, and 005 have been abandoned and plugged (Ref. 12, pp. 13–14). Outfall 001 continued to accept effluent from the on-site WWTP until sometime prior to 2018 and currently is not listed as a NPDES permitted outfall (Refs. 10, p. 9; 11, p. 69; 12, pp. 6–7; 63).

START's search of EPA's ECHO database and Ohio EPA's individual wastewater discharge permit information for the site does not identify any current NPDES permit; the ECHO report for WPSC indicates that the NPDES permit was terminated on May 31, 2019 (Refs. 3; 48; 51).

Portions of the site are in a floodway, and the remaining portions are in a special flood hazard area, the 100-year floodplain (Ref. 52). The mean annual flow rate for the Ohio River is available from 1979 until 1995 and ranges from a low of 29,520 cubic feet per second to a high of 53,190 cubic feet per second (Ref. 53, pp. 3–4).

4.2.2. Surface Water Targets

In accordance with the PA guidance, START evaluated targets along the 15-mile (in-water) downstream TDL. Targets include drinking water intakes, fisheries, and sensitive environments. The in-water segment TDL begins at the probable point of entry to surface water and continues downstream for 15 miles (Ref. 8). The 4K Industrial Park discharged into the Ohio River near Ohio River Mile 87.8 (Ref. 14, p. 3). Currently, the 4K Industrial Park does not have a NPDES-permitted outfall (Ref. 63). Two probable points of entry (PPE) are estimated for the site in the Ohio River at Outfalls 001 and 005, which received stormwater and wastewater from the site for discharge into the Ohio River (Appendix A, Figure 4). This segment of the Ohio River is described by Ohio EPA River Code 25-600, EPA River Reach Number 05030106-NA, (County: Belmont; Ecoregion: Western Allegheny Plateau). The Ohio River is presently designated as a warmwater habitat, agricultural water supply, industrial water supply, public water supply, and bathing water area. In addition, the Ohio River must meet the specific water quality standards listed in OAC Rule 3745-1-32 (Ref. 14, p. 3).

Bellaire Public Water Systems obtains water supplies from the Ohio River approximately 6.5 miles downstream from the site (Ref. 45, p. 4). The system is supplemented with water drawn from one supply well and water is purchased from the Belmont County Sanitary District 3 public water supply. The system supplies a population of 4,278 (Ref. 45, p. 12). The percentage of the total system's output supplied by each source of water—well and purchased water—was not publicly available.

A 6.89-acre wetland lies along the Ohio River adjacent to 4K Industrial Park property. Surface water runoff from the source can enter the wetland, which has a perimeter of 0.82 mile. Approximately 2.5 miles of wetlands are identified along the 15-mile downstream TDL of the Ohio River (Ref. 54).

Lastly, the Ohio River is used for recreation fishing (Ref. 55). Federal endangered and threatened species that could be associated with the Ohio River within the 15-mile TDL include the endangered Indian bat (*Myotis sodalist*) and threatened northern long-eared bat (*Myotis septentrionalis*) (Ref. 56).

4.2.3. Surface Water Conclusions

Surface water runoff from the site flowed to the Ohio River through multiple outfalls. As mentioned, the site in the 100-year floodplain of the Ohio River, and there is a high likelihood of a release from the site into the Ohio River because their proximity, the operation of current and historic outfalls to the river, and the presence of a 100-year floodplain; however, the likelihood of actual contamination within a target area is low because of the high dilution rate of the Ohio River. Furthermore, the distance to the nearest surface

water intake is 6.5 miles downstream of the probable point of enter (PPE) to the Ohio River. The Ohio River would dilute any radiative components to below background within a few hundred feet.

4.3. SOIL EXPOSURE AND SUBSURFACE INTRUSION PATHWAY

This section discusses the soil exposure and subsurface intrusion pathway, as well as targets associated with this pathway, and draws component-specific conclusions.

4.3.1. Physical Characteristics

Most of the site is covered with buildings and asphalt (Appendix A, Figure 2). In preparation for the purchase of a portion of the site, in January 2013, ORP conducted soil sampling as part of its environmental due diligence. ORP collected 10 soil samples from the site, including two samples from each of five locations: one sample at the surface and another sample up to 35 feet bgs. ORP analyzed all samples for VOCs and metals and two soil samples for polycyclic aromatic hydrocarbons (Ref. 32, p. 2). No other concentrations of hazardous substances were detected in soil samples above Ohio Voluntary Action Program cleanup standards (Ref. 32, p. 5).

In February 2022, to address citizens' requests to determine potential human health effects posed by AMS, CORR collected soil samples in the site area. The results are discussed in Section 2.4.11 of this PA report. Radionuclides were detected about background.

As described in Section 2.4.12, on June 8, 2022, the BEHRP conducted scoping surveys on North 1st Street, Martins Ferry, Ohio and on a portion of the road owned by 4K Industrial Park, LLC leading to AMS's truck scales (Ref. 35, p. 2). The gamma count rate surveys identified four localized areas that met or exceeded the twice-background screening criteria. Two of the areas were in the public domain on the west side of North 1st Street, and two areas were on the restricted access road leading to the truck scales. BEHRP collected soil samples at five locations; three of the locations exceeded the screening criteria identified by the gamma count rate survey on North 1st Street. These three soil samples had the highest gamma count rate measurements (Ref. 35, p. 4). Dose modeling shows that no detrimental health effects to the public are probable and that the dose to the public is below the regulatory limit of 100 millirem per year (Ref. 35, p. 5).

4.3.2. Soil Targets

The site is active and has on-site workers. The number of workers is estimated to be less than 100. Commercial properties surround the site with residential areas interspersed (see Figure 2 in Appendix A).

The Martins Ferry High School football stadium is 2,500 feet from the site, and North Elementary School is less than one half mile west–southwest of the site, across Highway Route 7. Additionally, Mackey Elementary School is less than one half mile from the site's northern property (Refs. 5, p. 3; 12, p. 11).

Based on the U.S. Census, the residential population within a 1-mile radius, including residents in Ohio and West Virginia, is distributed as follows:

- 0–0.25 mile: 148 people
- 0.25–0.50 mile: 484 people
- 0.50–1.0 mile: 2,029 people (Ref. 50)

4.3.3. Soil Exposure and Subsurface Intrusion Pathway Conclusions

As discussed in Sections 2.2, Martins Ferry has been industrialized since the late 1870s. The site is covered with concrete, asphalt, and a building, thus reducing the potential for soil exposure. Further characterization of potential off-site soil contamination would be needed to evaluate potential impacts of fugitive emissions. Subsurface intrusion occurs when vapor-forming chemicals migrate from a subsurface source into an overlying building. A subsurface source of vapors was not identified near the site; thus, subsurface intrusion does not appear to be a threat. There is, however, the potential for radon gas emissions from waste and storage piles.

4.4. AIR MIGRATION PATHWAY

This section discusses the air migration pathway, as well as targets associated with this pathway, and draws component-specific conclusions.

4.4.1. Air Releases

Air sampling data for the site is unavailable. There is the potential for localized fugitive emissions from traffic creating dust and from openings in the interior of the AMS building when trucks enter and exit. Historic releases from the site would be considered part of RCRA corrective actions.

4.4.2. Air Targets

Fugitive emissions to air have the potential to threaten nearby targets, including residents, schools, and workers. The 2020 U.S. Census estimates that the average household size in Martins Ferry, Ohio, is 2.38 persons (Ref. 57, p. 1). Based on this data, the residential population within a 4-mile radius is distributed as follows:

- 0–0.25 mile: 148 people
- 0.25–0.50 mile: 484 people
- 0.50–1.0 mile: 2,029 people
- 1.0–2.0 miles: 2,877 people
- 2.0–3.0 miles: 4,781 people
- 3.0–4.0 miles: 6,106 people (Ref. 50)

4.4.3. Air Migration Pathway Conclusions

Fugitive emissions from the AMS facility have the potential migrate into the site soil as well as nearby commercial and residential properties. Air sampling data is unavailable to confirm a release-to-air migration pathway. In the absence of a release to air, the pathway score is low and would not contribute to the overall site score.

5. SUMMARY AND CONCLUSIONS

The purpose of START's PA is to differentiate sites that pose little or no potential threat to human health and the environment from sites that warrant further investigation. Based on the review of existing information about the site, soil contamination from operations on the 4K Industrial Park may have resulted from the transportation, treatment, storage, and use of hazardous substances.

The site was used for the manufacturing of a variety of steel products for the construction, container, appliance, converter/processor, steel service center, and automotive markets from approximately 1874 to 2012; thereafter, steel production discontinued, and the site became an industrial park that continued to operate the WWTP to treat brine generated from fracking. Later, in 2014, 4K Industrial Park, LLC leased two buildings in the park for a fracking wastewater treatment facility. There is the potential for the presence of soil contamination on the facility due to fugitive emissions from AMS operations as well as from releases from the transportation, treatment, storage, and use of hazardous substances due to the lack of secondary containment. Soil samples collected near the AMS facility have detected radioisotopes above background levels.

The area surrounding the site relies on groundwater for drinking water supplies, and Martins Ferry's municipal drinking water supply wells are located 150 feet east of the site. A wellhead protection area is located around the Martins Ferry Water Department public supply wells and encompasses the northern section of the 4K Industrial Park's boundary. Additionally, the aquifer underlying the site, with unconsolidated sediments, is permeable and susceptible to contamination from any potential releases to the surface. Groundwater samples collected near AMS Buildings 255 and 256 contained gross alpha concentrations that exceed the EPA MCLs established under the Safe Drinking Water Act. No background groundwater sample was collected; thus, concentrations above background levels cannot be determined. There is the potential for surface soil contamination from 4K Industrial Park, LLC and AMS operations. Therefore, there is the potential for the site to release hazardous substances into the groundwater migration pathway, thereby threatening nearby drinking water supplies.

Groundwater samples collected from the site detected dissolved cadmium in four of seven groundwater samples at levels above the EPA MCL, ranging from 13.6 µg/L to 89.8 µg/L. Additionally, between September 2015 and September 2021, concentrations of gross alpha in quantities above the MCL were detected in Monitoring Wells K-2 and K-3 with concentrations of 2,280 pCi/L and 26.3 pCi/L, respectively, whereas the MCL is 15 pCi/L. Finally, radium-228 was present in levels above the MCL of 5 pCi/L in each of three monitoring wells sampled at concentrations of 10, 8.72, and 20.9 pCi/L.

Results from Martins Ferry's finished water analysis show radium-228 detections below drinking water limits (MCLs), meeting EPA Safe Drinking Water Act standards.

One area of concern is the surface water migration pathway, as any potential releases from the site have the potential to reach the surface water intake in the Ohio River used by Bellaire Public Water Systems approximately 6.5 miles downstream. Fisheries and wetlands are also adjacent to the site, and the Ohio River has the potential to provide habitat for the Indian bat (*Myotis sodalist*) and northern long-eared bat (*Myotis septentrionalis*), federally endangered and threatened species, respectively; however, actual contamination of targets is not likely because of the high dilution rate of the Ohio River. The Ohio River would dilute any radiation components to below background levels within a few hundred feet.

Lastly, there was no subsurface source of vapors identified near the site. These sources occur when vapor-forming chemicals migrate from a subsurface source into an overlying building. Considering the apparent lack of a subsurface source of vapors, subsurface intrusion does not appear to be a threat. There is, however, the potential for radon gas emissions from waste and storage piles and fugitive emissions from AMS operations, such as the release of dust from the traffic and from the interior of the AMS facility, thus posing a threat to onsite workers and nearby populations.

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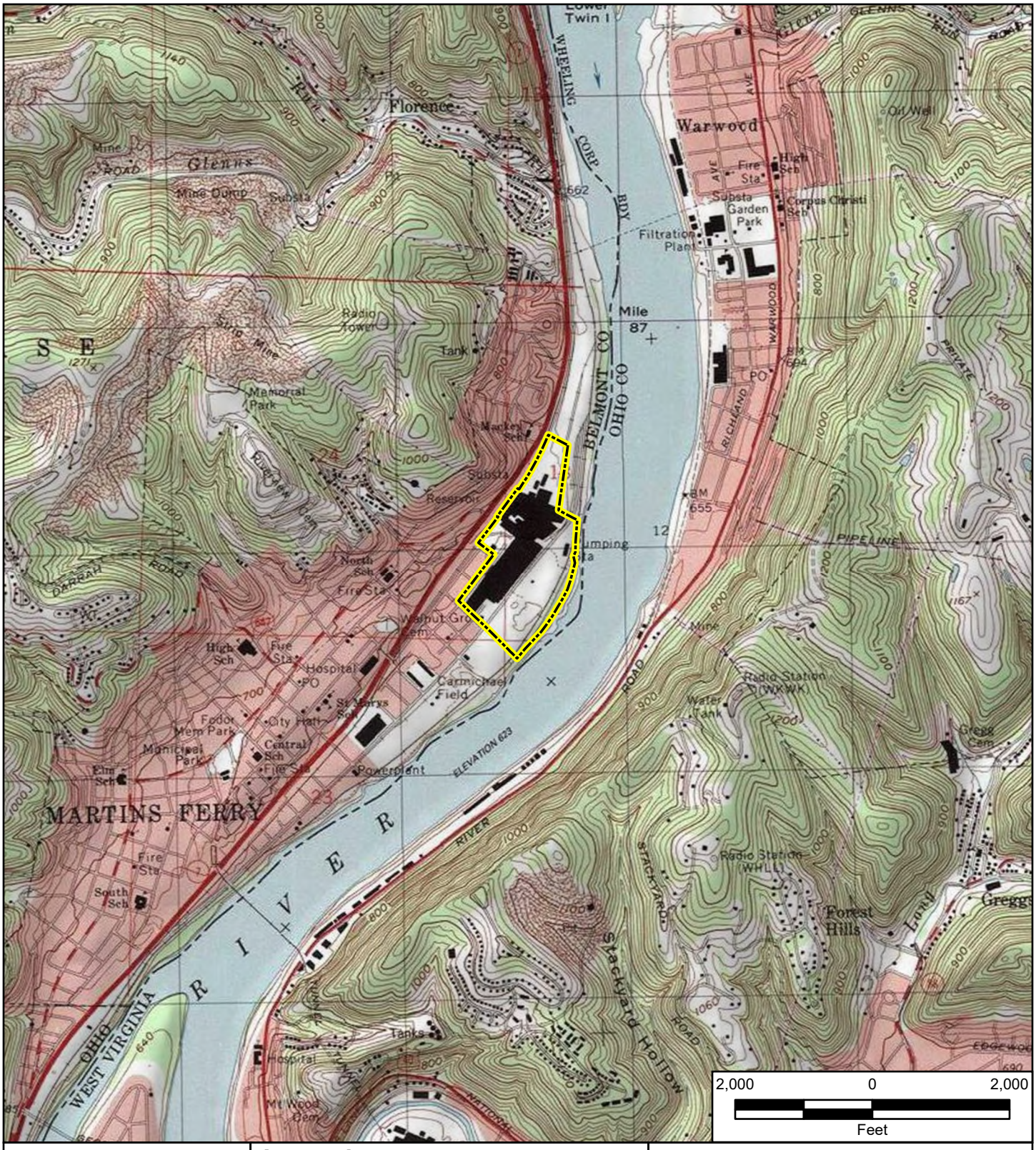
APPENDIX A

FIGURES



Reference Map

Legend

Approximate Site Boundary

N

4K Industrial Park
Martins Ferry, Belmont County, Ohio

FIGURE 1
SITE LOCATION

TETRA TECH

Prepared For: EPA	Prepared By: Tetra Tech Inc.

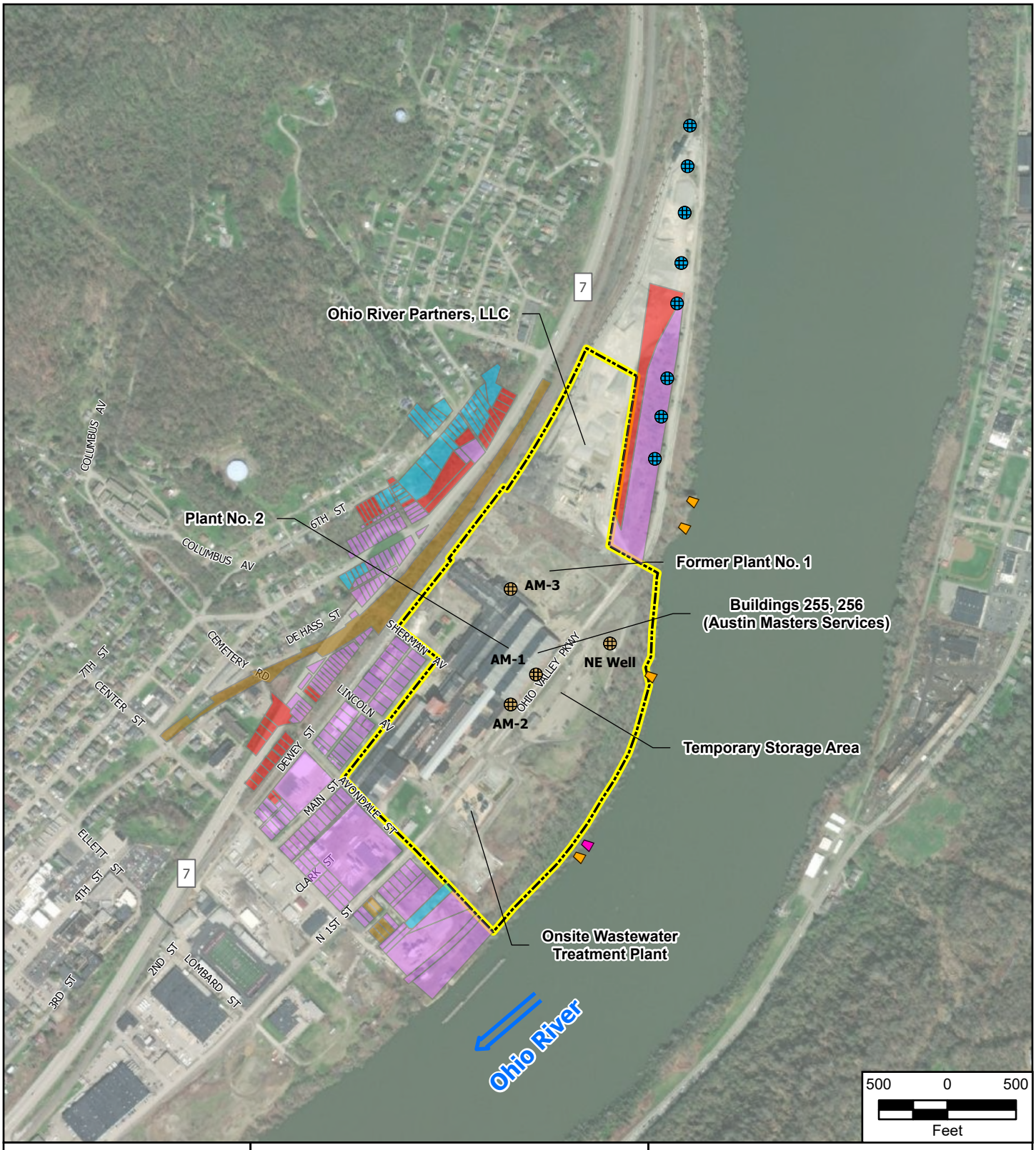
File Path: C:\Users\Hong.Sun\Documents\ArcGIS\Projects\AMS_OH\AMS_OH.aprx

Date Saved: 11/27/2022

EPA Contract No.: 68-HE-0519-D0005

TO-TOLIN No.: F0072-0001DE102

Coordinate System: NAD 1983 StatePlane Ohio South FIPS 3402 Feet
Datum: North American 1983
Units: Foot US



Reference Map

Legend

- Approximate Site Boundary

Outfalls
- Active
- Inactive
- Monitoring Wells
- Municipal Wells

Parcels
- Commercial/Industrial
- Residential
- Multiple
- Unknown

N

4K Industrial Park
Martins Ferry, Belmont County, Ohio

FIGURE 2
SITE LAYOUT

TETRA TECH

Prepared For: EPA	Prepared By: Tetra Tech Inc.

File Path: C:\Users\Hong.Sun\Documents\ArcGIS\Projects\AMS_OH\AMS_OH.aprx

Date Saved: 11/27/2022

EPA Contract No.: 68-HE-0519-D0005

TO-TOLIN No.: F0072-0001DE102

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Datum: WGS 1984
Units: Meter

Reference Map

Legend

- 2015 Monitoring Wells

Outfalls

- Active
- Inactive
- Approximate Site Boundary

N

4K Industrial Park
Martins Ferry, Belmont County, Ohio

FIGURE 3
2015 Monitoring Well Locations

TETRA TECH

Prepared For: EPA	Prepared By: Tetra Tech Inc.

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Date Saved: 3/29/2023

EPA Contract No.: 68-HE-0519-D0005

TO-TOLIN No.: F0072-0001DE102

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
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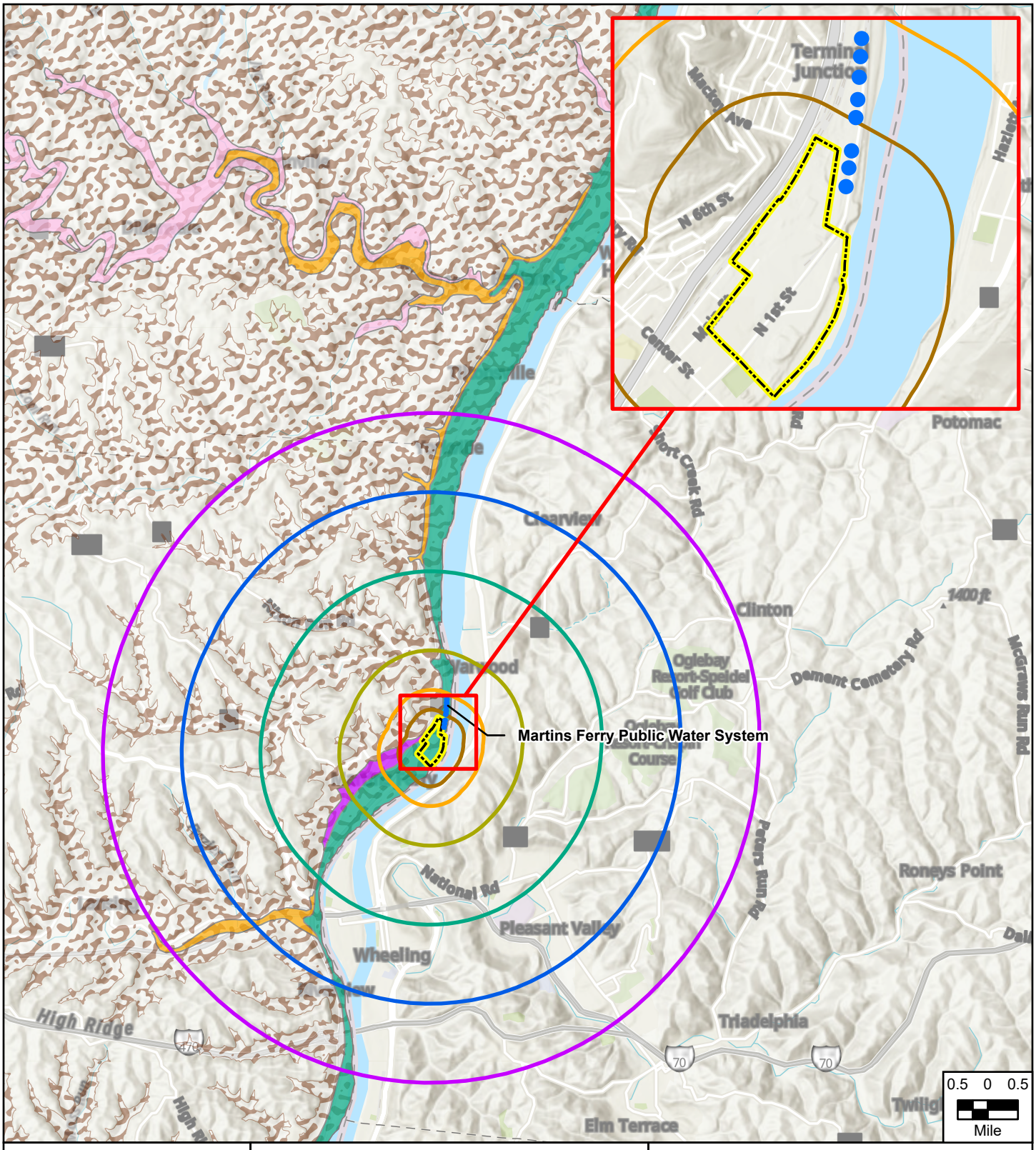
Units: Meter



Reference Map

Legend

- Martins Ferry Public Water System
- Approximate Site Boundary

Distance from the Source (mi)

- 0.25
- 0.5
- 1
- 2
- 3
- 4

Consolidated Aquifers

Yield (gpm)

- 0 - 5

Unconsolidated Aquifers

Yield (gpm)

- < 5
- 5 - 25
- 25 - 100
- 100 - 500
- > 500

N

4K Industrial Park
Martins Ferry, Belmont County, Ohio

FIGURE 4
FOUR-MILE TARGET DISTANCE LIMIT MAP
Aquifers

TETRA TECH

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Date Saved: 3/29/2023

EPA Contract No.: 68-HE-0519-D0005

TO-TOLIN No.: F0072-0001DE102

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
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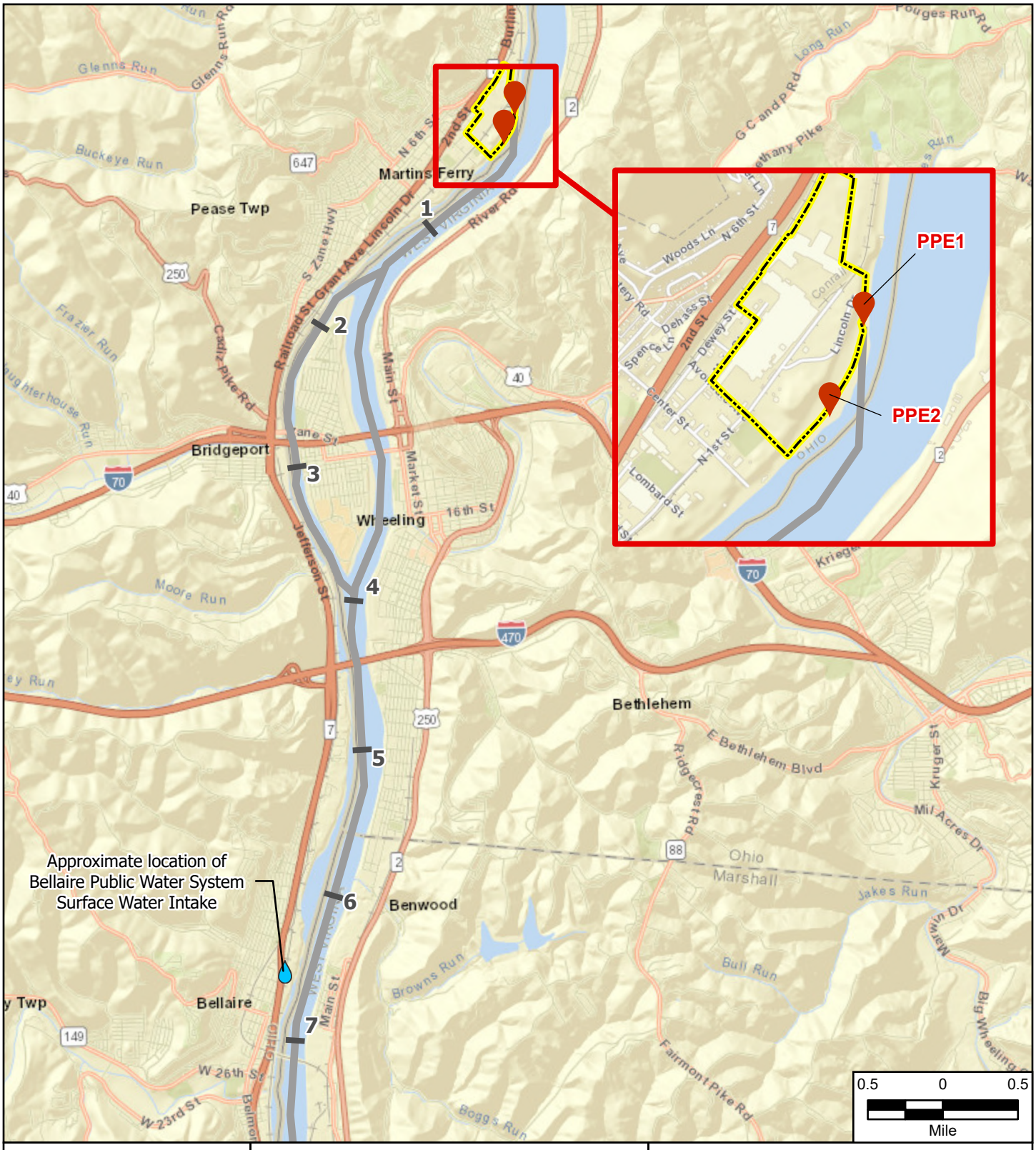
Units: Meter



Reference Map

Legend

- PPE (Probably Point of Entry)
- Mile Markers along Pathways
- Surface Water Migration Pathways
- Approximate Site Boundary

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

N

4K Industrial Park
Martins Ferry, Belmont County, Ohio

FIGURE 5
15-MILE DOWNSTREAM TARGET DISTANCE LIMIT MAP - Page 1

TETRA TECH

Prepared For: EPA	Prepared By: Tetra Tech Inc.

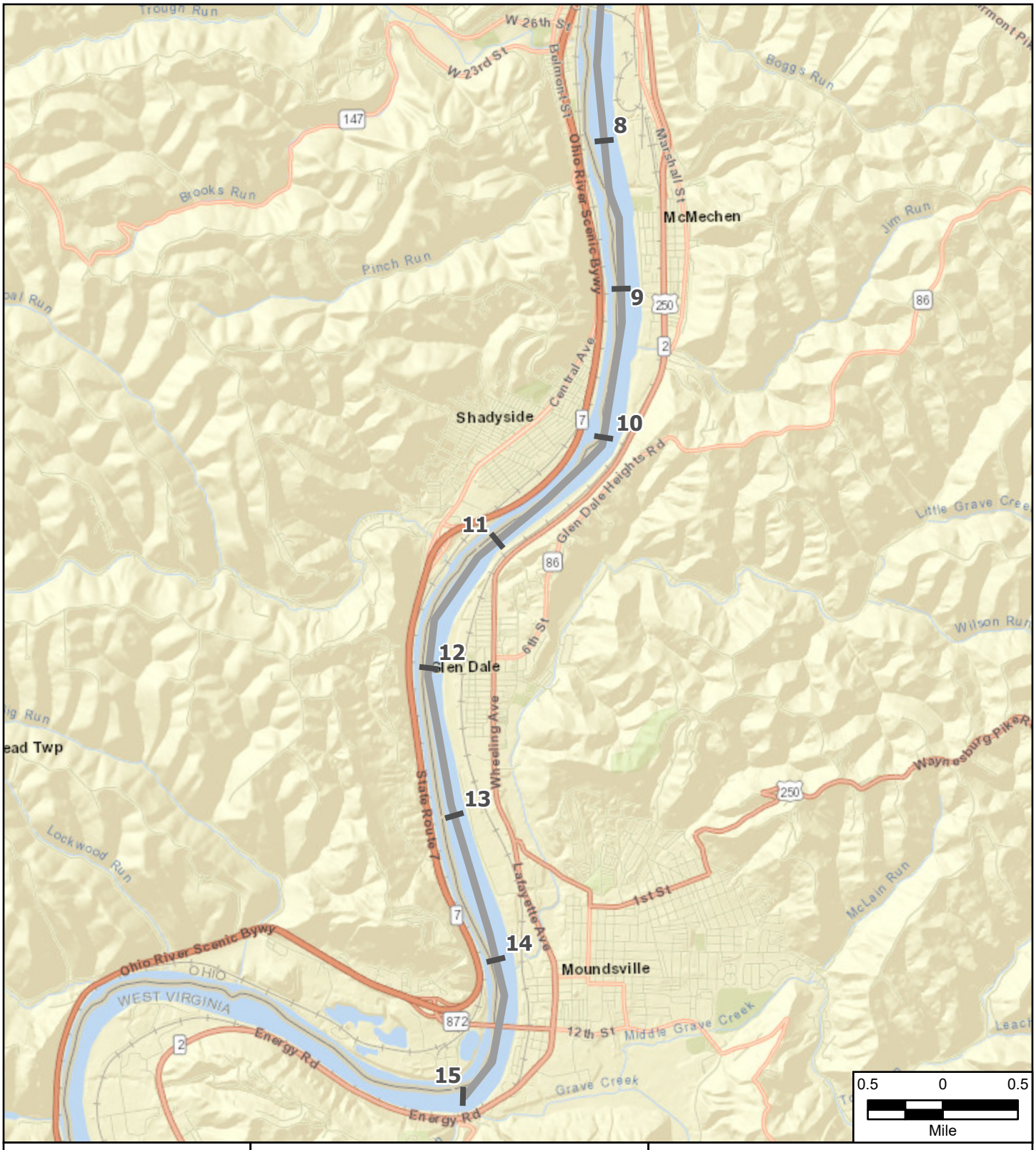
File Path: C:\Users\Hong.Sun\Documents\ArcGIS\Projects\AMS_OH\AMS_OH.aprx

Date Saved: 3/29/2023

EPA Contract No.: 68-HE-0519-D0005

TO-TOLIN No.: F0072-0001DE102

Coordinate System: NAD 1983 StatePlane Ohio South FIPS 3402 Feet
Datum: North American 1983
Units: Foot US



Reference Map

Legend

- PPE (Probably Point of Entry)
- Mile Markers along Pathways
- Surface Water Migration Pathways
- Approximate Site Boundary

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

N

4K Industrial Park
Martins Ferry, Belmont County, Ohio

FIGURE 5
15-MILE DOWNSTREAM TARGET DISTANCE LIMIT MAP - Page 2

TETRA TECH

Prepared For: EPA	Prepared By: Tetra Tech Inc.

File Path: C:\Users\Hong.Sun\Documents\ArcGIS\Projects\AMS_OH\AMS_OH.aprx

Date Saved: 3/29/2023

EPA Contract No.: 68-HE-0519-D0005

TO-TOLIN No.: F0072-0001DE102

Coordinate System: NAD 1983 StatePlane Ohio South FIPS 3402 Feet
Datum: North American 1983
Units: Foot US

APPENDIX B

TABLES (SITE OWNERSHIP, HISTORY OF OPERATIONS, AND INSPECTIONS)

TABLE B-1 — OWNERSHIP HISTORY	
Year of Purchase	**Owner**
1874	Ohio City Nail Works Company
1878	Laughlin Nail Company (two separate operations: nail factory and tin plate factory)
1900	American Tin Plate Corporation (purchased the plate factory)
1900–1908	Wheeling Corrugating Company (purchased the nail factory)
1920	Wheeling Steel Corporation (purchased Wheeling Corrugating Company)
1924–1959	Wheeling Steel Corporation (purchased the tin plate factory)
1968	Wheeling Steel Corporation (merged with Pittsburg Steel Company to become Wheeling-Pittsburg Steel Corporation)
2007	Esmark Incorporated (acquired Wheeling-Pittsburg Steel Corporation)
2008	Severstal North America, Inc. (acquired Esmark Incorporated)
2012	4K Industrial (purchased 37.5 acres)
2013	Ohio River Partners, LLC (purchased 9.91 acres)
2014	Austin Master Services, LLC (became tenant at the 4K Industrial Park)

Source: Reference 10, pages 3, 4, 8

TABLE B-2 — SUMMARY OF SITE ACTIVITIES	
Year	**Activity**
1874–2012	Steel manufacturing
1996	Wheeling-Pittsburg Steel Corporation manufacturing operations discontinued
September 9, 2012	4K Industrial Park, LLC purchasing of the site
December 12, 2023	4K Industrial Park, LLC application to Ohio Department of Natural Resources (ODNR) Division of Oil and Gas Resources Management (DOGRM) requesting to operate a brine water recycling and treatment facility
January 3, 2014	ODNR permit issuance to 4K Industrial Park, LLC to operate a brine water recycling and treatment facility
September 9, 2014	4K Industrial Park, LLC issued NPDES Permit OH0011339 authorizing discharge under NPDES Permit OH0011339
October 24, 2014	Austin Master Services, LLC (AMS) permit application submittal to DOGRM to operate an oil and gas production waste processing facility
October 27, 2014	4K Industrial Park, LLC leasing space at the industrial park to AMS to processes Marcellus and Utica shale fracking waste, which contains uranium, thorium, and radium
November 26, 2014	DOGRM Chief's Order 2014-541 issuance, authorizing the receipt and processing of liquid as well as suspension and solid oil and gas waste substances at the AMS facility
2016 to 2018	4K Industrial Park, LLC operation of a wastewater treatment plant to treat brine generated from fracking
February 26, 2019	Ohio Department of Health license issuance for radioactive material to AMS
2021	4K Industrial Park, LLC generation and disposal of hazardous waste using Resource Conservation and Recovery Act (RCRA) Permit OHD010448231, which included Wastes D002, D007, and D008
July 6, 2022	Ohio EPA issuance of air pollution permit to install and operate to AMS

Source: References 10 and 11

TABLE B-3 — SUMMARY OF DIVISION OF OIL AND GAS RESOURCES MANAGEMENT INSPECTION REPORTS FOR THE 4K INDUSTRIAL PARK	
Inspection Observations	**Recommendations/Notes**
March 26, 2015	
Parties discussed the design and progress with tank lining; the tanks were nonoperational. The finished storage tank (200,000 gallons), equalization receiving tank (200,000 gallons), and clarifier (300,000 gallons) were coated with polymer-type liner. Corrosion was at the base of some of the tanks (not specified); a new lime and polymer tank was installed.	Provide a: (1) complete design and construction plan; (2) list of all chemicals onsite and associated material safety data sheet; (3) plan for flooding; and (4) radiological materials handling and safety plan for the technologically enhanced naturally occurring radioactive material (TENORM). Additionally, notify Division of Oil and Gas Resource Management (DOGRM)two weeks before operations begin.
July 21, 2015	
DOGRM responded to a complaint regarding the transport of fracking waste to the plant for sorting and storing prior to transportation to a landfill. The facility is not operational, and there was no evidence of fracking waste being transported to the site. Water was being pumped from the Ohio River to a holding tank, and the liner for secondary containment was complete. Additionally, the loading dock at lime tower was under construction, and “rock boxes” and the truck transfer station were complete.	Notify DOGRM prior to commencement of operations.
September 16, 2015	
The facility had yet to operate or receive brine waters; two containment areas had standing water, and a holding tank was full of rainwater. Construction of the loading dock at the lime tower was complete.	Manage stormwater accumulation in containment areas.

TABLE B-3 — SUMMARY OF DIVISION OF OIL AND GAS RESOURCES MANAGEMENT INSPECTION REPORTS FOR THE 4K INDUSTRIAL PARK	
Inspection Observations	**Recommendations/Notes**
January 27, 2017	
The facility had yet to operate or receive brine waters. The treated water containment area was constructed and lined for holding six tanks. Rainwater accumulated in all secondary containment areas. The truck on/off loading area was constructed, and solids from the construction was to be sent to Austin Masters Services, LLC (AMS). All vehicles were to be screened for elevated radiation, with readings over 100 microrem per hour sent to AMS. The solids storage area was to be constructed on the northern side of the treatment plant.	Manage stormwater accumulation in containment areas and obtain pre-operational groundwater samples from monitoring wells. Notify DOGRM when the facility accepts brine or other wastes and provide schematic drawings of the facility. Ensure that facility construction follows the Ohio Basic Building Code; inspect electrical work. Update the radiation protection plan in response to DOGRM comments.
April 12, 2017	
The facility had yet to operate or receive brine waters, but industrial water was received and processed. The clarifier broke and needed repair. Multiple frac tanks and vac boxes containing industrial waters were located south of the containment area with no secondary containment; waters were pumped off the top of the frac tanks.	Provide a secondary containment for all oil and gas waste substances and obtain pre-operational groundwater samples from monitoring wells; notify DOGRM when brine or other wastes received. Provide schematic drawings to reflect construction of the facility and ensure that facility construction follows the Ohio Basic Building Code; inspect electrical work. Update radiation protection plan in response to DOGRM comments.
January 3, 2018	
Two “halve-rounds” containing oilfield sludge were stored on the western platform; water was being withdrawn from the Ohio River.	Remove stormwater and debris from secondary containment; maintain pre-operational groundwater analytical data on site.
February 12, 2019	
Stormwater was collecting in the secondary containment. The trip report does not state if the wastewater treatment plant (WWTP) is operational, but it appears operational per the photographs.	Address the stormwater in the secondary containment area.

TABLE B-3 — SUMMARY OF DIVISION OF OIL AND GAS RESOURCES MANAGEMENT INSPECTION REPORTS FOR THE 4K INDUSTRIAL PARK	
Inspection Observations	**Recommendations/Notes**
April 18, 2019	
Stormwater was collecting in the secondary containment. The trip report does not state if the WWTP is operational, but it appears operational per the photographs.	Address the stormwater in the secondary containment area.
February 7, 2020	
DOGRM met with site representatives to discuss the future of the site; 4K Industrial Park plans to continue to process liquid waste and proposes the addition of tanks, a pipeline, and an offloading for barge traffic on the Ohio River. DOGRM observed the loading and offloading area, "rock box" containment area, 2,000-gallon equalization tank, and 300,000-gallon clarifier tank. There was a tarped roll-off container with a geomembrane bag for dewatering solids in the southern access part of the facility. Stormwater was observed in rock box and caustic soda secondary containment.	Continue to manage stormwater in the secondary containment in the treatment areas and rock box.

Source: Reference 15

TABLE B-4 — SUMMARY OF DIVISION OF OIL AND GAS RESOURCES MANAGEMENT TRIP REPORTS FOR AUSTIN MASTER SERVICES, LLC FACILITY	
Inspection Observations	**Recommendations/Notes**
September 16, 2015	
The facility is now in operation.	Place all material considered oil and gas waste, treated or not, on or in a secondary containment within the primary containment.
March 30, 2016	
There were no issues to report.	*not applicable*
July 7, 2016	
There were no issues to report.	Place oil and gas waste on secondary containment.
December 14, 2016	
There were no issues to report.	*not applicable*
April 12, 2017	
The floors appeared to be dirty with oilfield wastes. When asked about the cleanliness of the warehouse, the facility contact stated the warehouse roof leaks water during rain events, making it difficult to keep the warehouse floors clean. Filter socks are being stored on the warehouse floor in one large pile. There was no apparent designated area for the storage of filter socks.	Continue or implement procedures to improve the "cleanliness" of the warehouse floor. Regularly hose the floor to ensure waste substances are maintained in the pits and not tracked by equipment.

TABLE B-4 — SUMMARY OF DIVISION OF OIL AND GAS RESOURCES MANAGEMENT TRIP REPORTS FOR AUSTIN MASTER SERVICES, LLC FACILITY	
Inspection Observations	**Recommendations/Notes**
July 5, 2017	
Wastes were being stored directly on the warehouse floor. The concrete floor is the only containment for these wastes. There is no secondary containment. Filter socks are being stored in two separate piles on the warehouse floor. One storage area was ready to be loaded into rail cars and was in line with the large overhead doors, adjacent to the rail lines. The other area was reportedly used for storage of low-level radioactive wastes to be blended into other wastes. This area was on the far right, towards the front of the building. The floor was tracked with what appeared to be oilfield wastes. The potential exists for radioactive and other wastes to be tracked out the warehouse by trucks entering the warehouse building.	Continue and/or implement procedures to improve the "cleanliness" of the warehouse floor and prevent tracking of wastes outside of the facility. Regularly hose the floor to ensure waste substances are maintained in the pits and not tracked by equipment or vehicles. Provide primary containment and secondary containment for all oilfield wastes. Provide secondary containment for empty boxes that have not been cleaned.
October 26, 2017	
Wastes were being stored directly on the warehouse floor. The concrete floor is the only containment for these wastes. There is no secondary containment. Previously (July 5, 2017), filter socks were being stored in two separate piles on the warehouse floor. One storage area was in line with the large overhead doors, adjacent to the rail lines. The other area was reportedly used for storage of low-level radioactive wastes to be blended into other wastes. This area was on the far right, towards the front of the building. During the inspection, few filter socks were observed in either pile.	Empty and clean the secondary containment pit where half rounds used to offload wastes had been overflowed by November 8, 2017. Do not use primary containment as secondary containment. Provide primary containment and secondary containment for all oilfield wastes. Provide secondary containment for empty boxes that have not been cleaned.

TABLE B-4 — SUMMARY OF DIVISION OF OIL AND GAS RESOURCES MANAGEMENT TRIP REPORTS FOR AUSTIN MASTER SERVICES, LLC FACILITY	
Inspection Observations	**Recommendations/Notes**
November 9, 2017	
A new primary containment was on site, but not yet installed, for emptying sludges out of vac boxes. This containment was a fabricated steel box that would replace the half rounds. Vac boxes and other wastes vessels were being stored outside in the gravel lot between the river and the rail tracks. Reportedly, these are all empty. The secondary containment for the half rounds, used for offloading vac boxes, had been cleaned. The previously applied spray liner was visible on the concrete of the secondary containment. The liner material that could be seen appeared to be intact. Solid wastes were being stored directly on the warehouse floor. The concrete floor is the only containment for these wastes. There is no secondary containment.	Provide primary containment and secondary containment for all oilfield wastes. Submit design documents for the secondary containment to the division for approval prior to construction. Provide the division a schedule for implementing adequate containments and updating the existing facility application. The updated facility application should include: (1) all primary and secondary containment volumes, locations, and details; (2) equipment; (3) boundaries of facility operations (to include any full or empty box storage and potential flood relocation areas); and (4) operations performed at the facility. Include the guidelines for submission of a complete application. (AMS is currently operating outside the approved application documents that constitute the authorization included in the Chief's Order.)
February 22, 2018	
Waste was on the floor of the loading area and at the entrance/exit to the warehouse building. This waste may adhere to the truck tires and be tracked outside the warehouse building. A new concrete unloading pad has been constructed. The new pad slopes back toward the pit. This will improve truck unloading and housekeeping. There was waste stored on the floor of the building. AMS stated that wastes will no longer be stored on the floor without secondary containment and that this was a volume issue. Wastes were noted on the floor in the proximity of the electrical panels. A new basin with liner and a recently poured concrete dump ramp was installed. The ramp sloped towards the pit. Loading of a truck from the new containment bins was observed. The loader was tracking wastes onto the warehouse floor during the loading of the truck.	Provide primary containment for all wastes. Secondary containment shall not be used as primary containment. Provide the division a schedule for removing the wastes from the warehouse floor by March 2, 2018. No wastes shall be stored on the warehouse floor without providing a liner or other means of primary containment. Implement housekeeping practices to minimize tracking of waste outside of the facility. Develop a means to clean truck tires or prevent spillage that may be tracked off the facility property. Improve mixing and loading techniques to keep wastes within the containments. Implement more frequent clean-up of wastes that are spilled, tracked, and otherwise outside of the containment areas.

Source: Reference 25

TABLE B-5 — SUMMARY OF DIVISION OF OIL AND GAS RESOURCES MANAGEMENT SITE INSPECTIONS FOR THE AUSTIN MASTER SERVICES, LLC FACILITY	
Inspection Observations	**Recommendations/Notes**
May 8, 2018	
The facility was not operating, and the secondary containment, where stormwater ponded, was deteriorating. There were two "halve-rounds" containing oilfield sludge stored on western platform; dark liquid leached from under the platform, and this was attributed to rainwater infiltrating the concrete. There was also a leak in the flow meter pipe. Finally, the southern fiberglass tank manway was deteriorating, and there was a hole in the liner of northwest clarifier tank.	Remove stormwater and debris from secondary containment, and repair both the clarifier tank liner and the repair pipe leak. Remove spilled material on the liner and confirm the source of the dark liquid leachate. Investigate deterioration associated with the manway.

TABLE B-5 — SUMMARY OF DIVISION OF OIL AND GAS RESOURCES MANAGEMENT SITE INSPECTIONS FOR THE AUSTIN MASTER SERVICES, LLC FACILITY	
Inspection Observations	**Recommendations/Notes**
September 7, 2018	
Division staff observed one blue frac tank being removed from the facility onto the public roadway, and waste was falling off the truck as it left the facility. The floor was extremely dirty. Crews were cleaning up waste that had spilled out of primary containment. The material on the floor did not contain free liquids. There was waste tracked across the working floor and caked on the yellow bumpers near the gondola loadout area. Waste was being stored on the secondary containment in the truck unloading pit. Material that collects on the splash guard falls behind the primary containment into the secondary containment. The down blending storage bins near the truck loadout were overflowing with waste. Free liquids were observed flowing out of one bin and onto the warehouse floor. Liquid was observed on the floor under the vac boxes staged for processing. Waste appeared to have made it into the open hydraulic and electrical chases under the floor near the filter press. Due to conditions of the facility, it appears waste is being tracked out of the facility and onto the ground.	Division staff discussed concerns regarding tire tracks from trucks with Austin Masters Services, LLC (AMS). AMS attributed to dirt tracked in from the trucks. Division staff held a meeting to review inspection findings with AMS. Staff informed AMS of Division of Oil and Gas Resource Management (DOGRM) rules and objectives for managing waste properly. Concerns were expressed by AMS over the frequency of visits and volume of comments received on the design submittal. DOGRM stated DOGRM was disappointed in the conditions of the facility and the inability to manage the volume of waste taken in the facility and not track outside or store on secondary containment." The cleaning measures and schedule were again requested for verification. Immediately stop storing waste on the secondary containment. Remove all wastes from the warehouse floor, including the truck loadout, to prevent trucks from tracking wastes outside of the warehouse. Maintain a log of housekeeping activities for review at the next quarterly visit. Reduce waste volumes in the concrete containment bins. Operate within the limits of the storage capacities and processing capabilities of the facility. Repair and/or replace the roof. Stormwater ponding and running across the floor increases the opportunity for the waste to be tracked from the warehouse and is a hazard for the workers. Install temporary curbing and secondary containment under the filter presses until a final solution can be engineered and constructed. Improve truck cleanout procedures to prevent waste from being sprayed and washed onto secondary containment.
February 12, 2019	
AMS continues to struggle with water issues on the floor of the warehouse due to leaks in the roof. Multiple (more than 10) 55-gallon drums were scattered across the warehouse floor with the purpose of capturing rain leaking through different areas of the roof.	Repair the roof to prevent rainwater from leaking onto the floor and into the waste piles. Water on the floor is a safety hazard and can allow tracking of waste substances out the facility. Manage the water as best as possible until the roof has been repaired.

TABLE B-5 — SUMMARY OF DIVISION OF OIL AND GAS RESOURCES MANAGEMENT SITE INSPECTIONS FOR THE AUSTIN MASTER SERVICES, LLC FACILITY	
Inspection Observations	**Recommendations/Notes**
April 18, 2019	
AMS continues to struggle with water issues on the floor of the warehouse due to leaks in the roof. Multiple (more than 10) 55-gallon drums were scattered across the warehouse floor for the purpose of capturing rain leaking through different areas of the roof.	Repair the roof to prevent rainwater from leaking onto the floor and into the waste piles. Water on the floor is a safety hazard and can allow tracking of waste substances out the facility. Manage the water as best as possible until the roof has been repaired.
August 5, 2019	
Both filter presses are in operational condition. Sludge Agitator 4, in the southern area of the facility, had been removed. A tarped hoop structure for mechanic work had been constructed to the northwest of Bin 7. An AMS representative voiced concern over water escaping from the storage bins onto the floor and the inefficiency of having to routinely suck up the water off the floor. DOGRM expressed concern over ensuring drainage way would have sufficient slope to move the water and not allow the water to stagnate or sit in the trench. The floor of the facility was free from wastes substances, except residual dry material. Housekeeping protocols were being implemented	Continue to implement housekeeping protocols and to maintain appropriate waste volumes in the concrete containment bins to allow for mixing and storing without spilling wastes onto the floor. Repair the roof to prevent rainwater from leaking onto the floor and into the waste piles. Water on the floor is a safety hazard and can allow tracking of waste substances out the facility. Manage the water as best as possible until the roof has been repaired.
February 7, 2020	
Storage bins for high-level technologically enhanced naturally occurring radioactive material (TENORM) waste were beyond capacity, and the waste was being stored beyond the berm and above the walls.	Repair the roof to prevent rainwater from leaking onto the floor and into the waste piles. Water on the floor is a safety hazard and can allow tracking of waste substances out the facility. Manage the water as best as possible until the roof has been repaired.

TABLE B-5 — SUMMARY OF DIVISION OF OIL AND GAS RESOURCES MANAGEMENT SITE INSPECTIONS FOR THE AUSTIN MASTER SERVICES, LLC FACILITY	
Inspection Observations	**Recommendations/Notes**
November 18, 2020	
The roof had been repaired since the last inspection. The trench drain in front of Storage Bins 1, 2, and 3 was being constructed during the inspection; therefore, half rounds were being stored in various locations around the facility to store low-level TENORM waste. Three 500-barrel vertical tanks were still being stored at the entrance of the facility. The low-level TENORM mixing pits were half full of waste. The floor of the facility had waste accumulated in several areas, including the filter press and truck washout.	Appropriately store waste within each bin's capacity or bring in additional roll-offs to facilitate proper storage. Establish and maintain a physical delineation around the filter sock grinder. Clean out sawcut drain to sump adjacent to Storage Bins 5, 6, and 7 as needed. Implement housekeeping protocols and maintain appropriate waste volumes in the concrete containment bins to allow for mixing and storing without spilling wastes onto the floor.
February 25, 2021	
The south truck wash area had been reconfigured, with the washing now occurring on the east side. The metal sheeting on the back of the half round on the east side had been removed. The grinder for processing filter socks was operational, and shredded filters were being stored in a half round underneath the grinder. A conveyor belt had been purchased to feed the socks into the grinder. Designated areas had been defined for drum storage. The trench drain and sump in front of Storage Bins 1, 2, and 3 were constructed and in use. The liquid from the sump was pumped into a plastic tank inside the secondary containment, which is adjacent to the sump. The floor of the facility had waste accumulated in several areas, including the filter press and truck washout.	Appropriately store waste within each bin's capacity or bring in additional roll-offs to facilitate proper storage. Repair metal sheeting on the back of the low-level TENORM mixing pit. Establish and maintain a physical delineation around the filter sock grinder. Clean out sawcut drain to sump adjacent to Storage Bins 5, 6, and 7 as needed. Implement housekeeping protocols and maintain appropriate waste volumes in the concrete containment bins to allow for mixing and storing without spilling wastes onto the floor.

TABLE B-5 — SUMMARY OF DIVISION OF OIL AND GAS RESOURCES MANAGEMENT SITE INSPECTIONS FOR THE AUSTIN MASTER SERVICES, LLC FACILITY	
Inspection Observations	**Recommendations/Notes**
June 29, 2021	
Further discussion was held on the amount of waste currently being stored at the facility, particularly the significant number of filter socks. The filter sock processing equipment continues to break down, with long lead times on parts. The low-level TENORM mixing pit had approximately 18 inches of freeboard. The metal sheeting was in place, but additional wear was noted on the panels. Storage Bins 5 and 6, containing filter socks, were at capacity. Storage Bin 7 was at 30 percent capacity. Filter socks previously being stored beyond the bin capacity had been relocated to roll-off containers for temporary storage. The floor of the facility was free of waste.	Continue to store waste within each bin's capacity or bring in additional roll-off containers to facilitate proper storage. Continue to clean out drain to sump adjacent to Storage Bins 5, 6, and 7 as needed. Continue with housekeeping protocols and maintain appropriate waste volumes in the concrete containment bins to allow for mixing and storing within the bins.
May 19, 2022	
Storage Bin 1 was at 50 percent capacity, Storage Bin 2 was at 40 percent capacity, and Storage Bin 3 was at 70 percent capacity. These bins contained recently stabilized waste, which was being loaded onto trucks for disposal at the time of the inspection. The floor of the facility was free of waste. The area underneath the filter press area was clean.	Continue to store waste within each bin's capacity or bring in additional roll-off containers to facilitate proper storage. Continue to clean out drain to sump adjacent to Storage Bins 5, 6, and 7 as needed and keep it free of waste. Continue to remove free liquids from the secondary containment for the storage bins.

TABLE B-5 — SUMMARY OF DIVISION OF OIL AND GAS RESOURCES MANAGEMENT SITE INSPECTIONS FOR THE AUSTIN MASTER SERVICES, LLC FACILITY	
Inspection Observations	**Recommendations/Notes**
August 24, 2022	
Storage Bin 5 was at 95 percent capacity, and Storage Bin 6 was at 95 percent capacity. Storage Bin 7's back wall had collapsed, and a sand berm was in place to temporarily stabilize the wall. It was reported that new concrete walls will be formed and poured within the next week. Cold mixing pit splash panels were in fair condition. The filter press solids bin was at 10 percent capacity. Tarps had been installed on the backs of the conveyors. The pump area had experienced an operational issue, and waste was observed in the secondary containment. Storage Bin 1 was at 90 percent capacity, Storage Bin 2 was at 100 percent capacity, and Storage Bin 3 was at 20 percent capacity. These bins contained recently stabilized waste, which was being loaded onto trucks for disposal at the time of the inspection.	Continue to store waste within each bin's capacity or bring in additional roll-off containers to facilitate proper storage. Remove waste from the secondary containment as soon as possible. Continue to clean out drain to sump adjacent to Storage Bins 5, 6, and 7 as needed and keep it free of waste. Continue to remove free liquids from the secondary containment for the storage bins.

Source: Reference 58

ATTACHMENT 1

EXCERPT FROM REFERENCE NO. 12

Table 2. SWMUs and AOCs Identified During the PA/VSI

Unit	Description	Recommendation
SWMU 1	Waste Containers for Baghouse Dust	**Medium Priority**
SWMU 2	Facility Underground Piping Lines	**Medium Priority**
SWMU 3	Historic Carbon Filter for Electric Room	**Medium Priority**
SWMU 4	Concrete Pits and Utility Trench Beneath 48" Galvanizing Line	**High Priority**
SWMU 5	Alkali Tank and Catch Basin on the 48" Galvanizing Line	**High Priority**
SWMU 6	Acid Tank and Trench on the 48" Galvanizing Line	**Medium Priority**
SWMU 7	Vent Exhaust Fan on the 48" Galvanizing Line	**Medium Priority**
SWMU 8	Zinc Chloride Tank (Including Secondary Containment) Located Near Baghouse	**High Priority**
SWMU 9	Baghouse for Galvanizing Lines	**Medium Priority**
SWMU 10	Chem Treat Waste Tote Along the 48" Galvanizing Line	**Low Priority**
SWMU 11	Waste Paint Satellite Accumulation Area Along the 48" Galvanizing Line	**Low Priority**
SWMU 12	Historic Chem Treat Accumulation Area Located in Plant 1 Area	**Low Priority**
SWMU 13	Former Plant No. 1 Units	**Medium Priority**
SWMU 14	Hazardous Waste Less-Than-90-Day Storage Area Located in Building 115	**Medium Priority**
SWMU 15	Multiple Interior Solid Waste Containers	**Low Priority**
SWMU 16	Former ARCO Scrubber Unit Located in Scrap Yard North of Plant No. 1	**High Priority**
SWMU 17	30-Foot Roll-Off Container for Asbestos Storage	**Low Priority**
SWMU 18	Former Acid and Alkali Waste Storage Area	**Low Priority**
SWMU 19	Used Oil Storage Area	**High Priority**
SWMU 20	Multiple Exterior Solid Waste Containers	**Medium Priority**
SWMU 21	Current Acid and Alkali Waste Storage Area Located East of the WWTP	**Low Priority**
SWMU 22	Waste Water Treatment Plant	**Medium Priority**
SWMU 23	Hydrochloric Acid Storage Area	**Medium Priority**
SWMU 24	Historic Used Oil Location	**Low Priority**
SWMU 25	Waste Acid and Alkali Tank Located in the Basement Underneath the 60" Galvanizing Line	**High Priority**
SWMU 26	Trench and Sump Located in the Basement Underneath the 60" Galvanizing Line	**Medium Priority**
SWMU 27	Waste Acid and Alkali Holding Tank Located Along the 60" Galvanizing Line	**Medium Priority**
SWMU 28	Cooling Water Tank Catch Basin Along the 60" Galvanizing Line	**Medium Priority**
SWMU 29	Chem Treat Waste Tote Along the 60" Galvanizing Line	**Low Priority**
SWMU 30	Waste Paint Satellite Accumulation Area Along the 60" Galvanizing Line	**Low Priority**
SWMU 31	Chromic Acid Sludge from the 36" Galvanizing Line	**Low Priority**
SWMU 32	Parts Washers	**Low Priority**
SWMU 33	Roll Grinding Waste	**Low Priority**
SWMU 34	Universal Waste Storage Area	**Low Priority**
SWMU 35	NPDES Permitted Outfalls	**Medium Priority**
AOC 1	Plant 1 Electrical Substation Transformers	**High Priority**
AOC 2	4,000-Gallon Gasoline UST Located in the Plant 1 Area	**Medium Priority**
AOC 3	6,000-Gallon Diesel AST Located in the Plant 1 Area	**Low Priority**
AOC 4	Former Leaking UST Located in the Plant 1 Area	**Low Priority**
AOC 5	Former Product Storage Area	**Medium Priority**
AOC 6	Leaking Transformer Adjacent to the No. 1 Fire Station	**High Priority**

Plant No. 2 Complex

Former Plant No. 1 Location

Onsite Wastewater Treatment Plant

Wheeling Pittsburgh Steel Corporation Facility
1001 Main Street
Martins Ferry, Ohio 43935
OHD010448231

Preliminary Assessment/
Visual Site Inspection Report
Wheeling Pittsburgh Steel Corporation
Martins Ferry, Ohio Facility

Prepared for EPA Region 5

August 2008

Figure 2, Site Vicinity Map

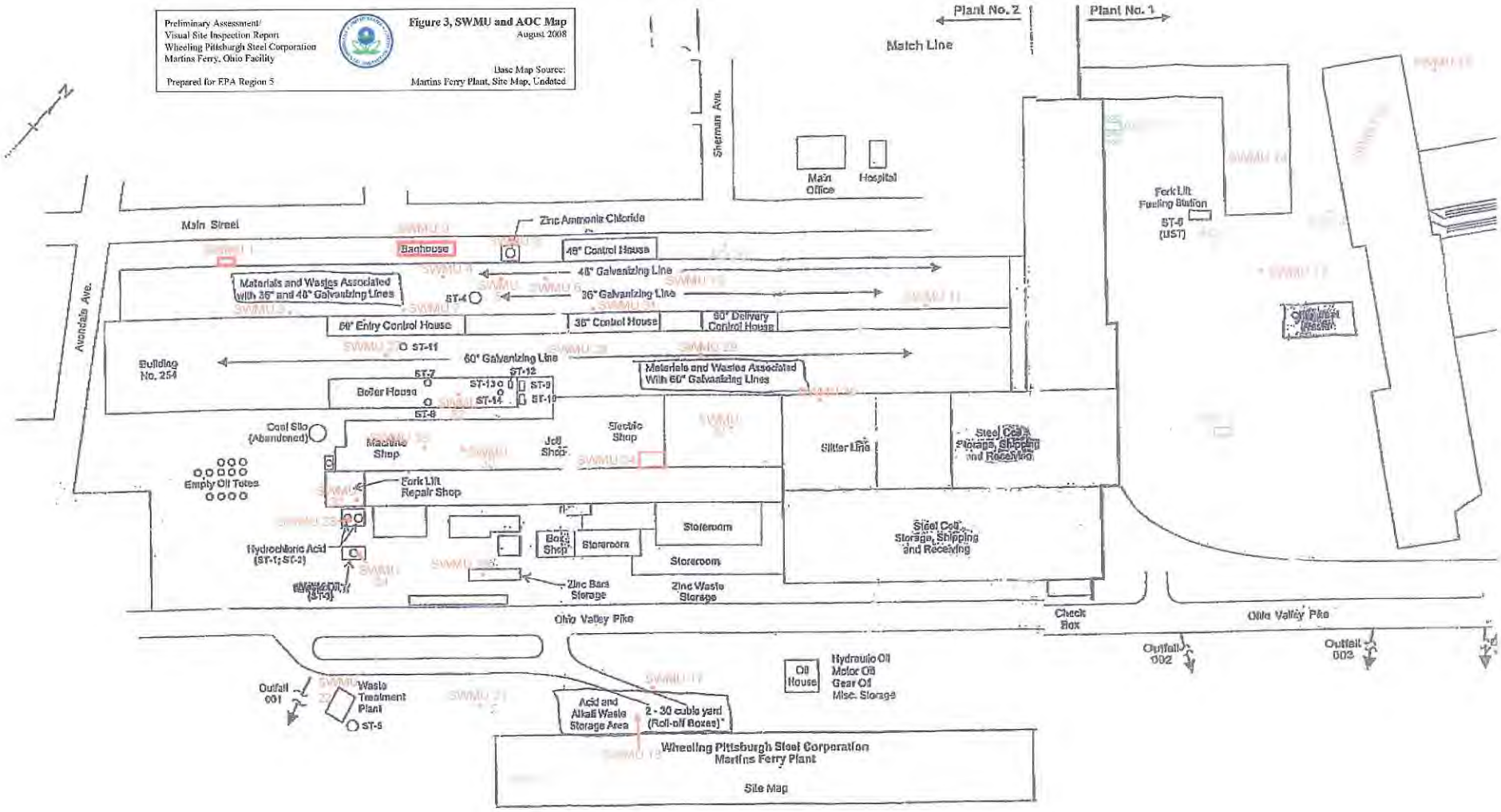
Base Map Source:
Google Earth (6/27/07)

Preliminary Assessment
Visual Site Inspection Report
Wheeling Pittsburgh Steel Corporation
Martins Ferry, Ohio Facility

Prepared for EPA Region 5

Figure 3, SWMU and AOC Map
August 2008

Base Map Source:
Martins Ferry Plant, Site Map, Undated



ATTACHMENT 2

EXCERPT FROM REFERENCE NO. 10

Appendix B - Solid Waste Management Units and Areas of Concern
Historical Investigation Summary Report
4K Industrial Park, LLC Facility
Martins Ferry, Ohio

SWMU No.	Description	PA/VSI Recommendations/Conclusions	PA/VSI Priority Ranking for Further Action	Completed Actions	Potential Outstanding Issues/Tasks
SWMU 1	Waste Containers for Baghouse Dust	Wheeling-Pittsburgh Steel Corporation (WPSC) should ensure that the baghouse dust containers are sufficiently secured (i.e., tarped or covered) and that good housekeeping procedures are employed to prevent releases to the concrete and conveyance to the storm drain. WPSC should provide specific Resource Conservation and Recovery Act (RCRA) waste characterization details for the baghouse dust, including toxicity characterization leaching procedure (TCLP) results if available.	Medium Priority	Unknown/No documented actions identified in the file material.	Ensure baghouse dust containers are sufficiently secured and good housekeeping procedures are employed to prevent releases. ***It is unclear if this issue remains applicable based on currently reported operations.*
SWMU 2	Facility Underground Piping Lines	WPSC should provide information on the types of piping materials used for the various piping lines (e.g., wastewater, acid, air); dates of operation of this unit; and any significant upgrades. WPSC should also confirm that no releases to the environment have occurred and ensure that the integrity of the piping is intact (i.e., no cracks or breaks are present). A video survey of the piping may be employed for further investigation of this SWMU.	Medium Priority	Unknown/No documented actions identified in the file material.	Confirm that no releases from the underground piping have occurred.
SWMU 3	Historic Carbon Filter for Electric Room	WPSC should determine which compound(s) the filter was targeting and the status of any used filters remaining in storage or in the unit itself. Furthermore, WPSC should characterize these waste filters and dispose of them accordingly.	Medium Priority	Unknown/No documented actions identified in the file material.	Characterize the waste filters and dispose of them. ***It is unclear if this issue remains applicable based on currently reported operations.*
SWMU 4	Concrete Pits and Utility Trench Beneath 48" Galvanizing Line	WPSC should confirm the integrity of the concrete pits that manage wastes similar to those found in the utility trench, provide the dates of operation of this unit, confirm that the only waste collected is used hydraulic oil, and indicate how often the pits are pumped out. If the concrete pits are also determined to be in poor condition, WPCS should expand the investigation of underlying soil at this SWMU.	High Priority	The Facility prepared a closure plan for the release of spent ChemTreat solution. The closure plan was implemented in 2010; however, the closure was never completed. An Ohio EPA March 18, 2011, letter states that due to evidence of soil contamination and detection of hexavalent chromium in groundwater, the area was classified as a "waste-in-place" closure. A May 4, 2018, letter states the Facility recently installed two downgradient groundwater monitoring wells adjacent to the ChemTreat area, in relation to its WWTP, and agreed to share initial data with Ohio EPA.	1. A February 27, 2018, letter from Ohio EPA states that 4K Industrial Park, LLC believed they were not liable for the outstanding ChemTreat area closure obligations due to the bankruptcy and the August 10, 2012 Martins Ferry Sale Order. However, the letter states, based on Ohio EPA's review of the Sale Order, the current owner of the site is liable for closure. It is unclear if this issue has been resolved. 2. The status of closure of this unit is unclear.
SWMU 5	Alkali Tank and Catch Basin on the 48" Galvanizing Line	WPSC should provide information on the dates of operation and integrity of the tank and catch basin, as well as any significant upgrades or documented spills. WPSC should also verify the integrity of the floor area surrounding the catch basin and employ controls to prevent overflows of the catch basin that result in releases to the floor.	High Priority	Unknown/No documented actions identified in the file material.	Evaluate integrity of the tank, catch basin, floor area, and identify documented spills.
SWMU 6	Acid Tank and Trench on the 48" Galvanizing Line	WPSC should provide information on the dates of operation and integrity of the acid wash tank and trench, as well as any significant upgrades or documented spills. WPSC should also verify the integrity of the floor area surrounding the trench and employ controls to prevent overflows of the tank that result in releases to the trench and/or floor.	Medium Priority	Unknown/No documented actions identified in the file material.	Evaluate integrity of the tank, trench, floor area, and identify documented spills.
SWMU 7	Vent Exhaust Fan on the 48" Galvanizing Line	WPSC should provide information on the integrity of the vapor ducts and indicate the specific air quality testing or monitoring methods used to confirm that this unit is functioning properly. The frequency of such testing should also be provided, along with the most recent set of air sampling results (indoor and outdoor) for this unit.	Medium Priority	Unknown/No documented actions identified in the file material.	Evaluate integrity of vapor ducts and provide air quality testing or monitoring data. ***It is unclear if this issue remains applicable based on currently reported operations.*
SWMU 8	Zinc Chloride Tank (Including Secondary Containment) Located Near Baghouse	WPSC should provide information on the dates of operation of the tank; confirm the integrity of the tank, secondary containment, and the pipelines that deliver flux to the process areas and rainwater to the waste water treatment plant (WWTP); and details on any historical releases from the tank and/or secondary containment. Furthermore, WPSC should provide waste characterization details for the "Galvanizing Baghouse Cleanout" waste, describe how the yellow "material" observed by EPA during the visual site inspection (VSI) was managed and disposed, and ensure that appropriate controls are implemented to prevent future releases to the environment.	High Priority	Unknown/No documented actions identified in the file material.	1. Evaluate potential for historical releases from the tank, pipeline, and/or secondary containment. 2. Address how the yellow material observed by EPA during the visual site inspection was managed and disposed.
SWMU 9	Baghouse for Galvanizing Lines	WPSC should ensure that the baghouse dust roll-off containers are sufficiently secured and that good housekeeping procedures are employed to prevent releases to the concrete. WPSC should provide specific RCRA waste characterization details for the baghouse dust, including TCLP results if available.	Medium Priority	Unknown/No documented actions identified in the file material.	Ensure baghouse dust containers are sufficiently secured and good housekeeping procedures are employed to prevent releases. ***It is unclear if this issue remains applicable based on currently reported operations.*
SWMU 10	Chem Treat Waste Tote Along the 48" Galvanizing Line	At the time of the VSI, no spills or staining were observed at this unit.	Low Priority	Unknown/No documented actions identified in the file material.	None based on PA/VSI.
SWMU 11	Waste Paint Accumulation Area Along the 48" Galvanizing Line	At the time of the VSI, no spills or staining were observed at this unit.	Low Priority	Unknown/No documented actions identified in the file material.	None based on PA/VSI.
SWMU 12	Historic Chem Treat Accumulation Area Located in Plant 1 Area	WPSC should provide the dates of operation for this roll-off container, any evidence of releases, associated spill responses (if any), and details regarding disposition of the roll-off.	Low Priority	Unknown/No documented actions identified in the file material.	Evaluate the potential for historical releases/spills in this area.
SWMU 13	Former Plant No. 1 Units	WPSC should provide information on the demolition activities and any underlying evidence of contamination. WPSC should also discuss the extent of demolition in this area and identify any subsurface structures (e.g., tanks, vaults, trenches, pits, basements) that were left in place. The former usage of and decontamination/closure process for these structures should be specified to allow for an assessment of the potential for past or future impacts to the environment. If potential contaminant sources remain in place, evaluation of soil and/or groundwater quality may be necessary for this SWMU.	Medium Priority	Unknown/No documented actions identified in the file material.	1. Provide information on demolition activities and underlying evidence of contamination; identify any subsurface structures (e.g., tanks, vaults, trenches, pits, basements) that were left in place. 2. Assess potential for impacts to the environment.
SWMU 14	Hazardous Waste Less-Than-90-Day Storage Area Located in Building 115	At the time of the VSI, no spills or staining were observed at this unit. However, WPSC should repair the roof to minimize the potential for contact between infiltrating precipitation and the hazardous waste containers stored in this building and any hazardous wastes that may be spilled from those containers. In addition, the building should be properly labeled as a less-than-90-day hazardous waste storage area under RCRA.	Medium Priority	Unknown/No documented actions identified in the file material.	Repair the roof to minimize the potential for infiltrating precipitation. ***It is unclear if this issue remains applicable based on currently reported operations.*
SWMU 15	Multiple Interior Solid. Waste Containers	At the time of the VSI, no hazardous wastes were being stored in the observed containers, and no evidence of a potential release was observed.	Low Priority	Unknown/No documented actions identified in the file material.	None based on PA/VSI.

Appendix B - Solid Waste Management Units and Areas of Concern
Historical Investigation Summary Report
4K Industrial Park, LLC Facility
Martins Ferry, Ohio

SWMU No.	Description	PA/VSI Recommendations/Conclusions	PA/VSI Priority Ranking for Further Action	Completed Actions	Potential Outstanding Issues/Tasks
SWMU 16	Former ARCO Scrubber Unit Located in Scrap Yard North of Plant No. 1	WPSC should continue to work with Ohio Environmental Protection Agency (Ohio EPA) on completing generator closure at this SWMU. Per the Closure Plan, WPSC should install a groundwater monitoring network to evaluate site-wide groundwater quality. However, based on the depth and areal extent of lead contamination in soil, focused groundwater sampling may be appropriate given the relatively remote location of this SWMU.	High Priority	An environmental covenant concerning the former ARCO Scrubber Ductwork Laydown Area located north of Plant No. 1 was entered into by RG Steel Wheeling, LLC and Ohio EPA on February 22, 2012, to prevent residential use of the property. Ohio EPA determined that the area had been closed according to the approved closure plan on September 20, 2013.	1. Install a groundwater monitoring network to evaluate site-wide groundwater quality. 2. The following is noted in the Closure Certification Report, dated December 10, 2010: • The lateral limits of contamination have not been completely determined, particularly west and south of the southern ductwork laydown area. • The potential for elevated lead concentrations in surface soil exists on the neighboring property to the west, which is a railroad right-of-way owned by Norfolk Southern. 3. The environmental covenant specifies annual written certifications that the activity and use limitations remain in place and are being complied with. It is unclear if such certifications have been made annually since 2012. 4. The Closure Certification Report calculated an industrial worker-based cleanup level for lead of 1,400 mg/kg, and a construction worker-based cleanup level of 750 mg/kg, for use in the closure of the area. Review calculated cleanup levels and associated the methodology be reviewed for appropriateness and consistency with current U.S. EPA guidance.
SWMU 17	30-Foot Roll-Off Container for Asbestos Storage	At the time of the VSI, no hazardous wastes were being stored at this unit, and no evidence of a potential release was observed. However, WPSC should confirm that North Fork Landfill is permitted to receive asbestos waste, and indicate how often the contents of this container are disposed.	Low Priority	Unknown/No documented actions identified in the file material.	None based on PA/VSI.
SWMU 18	Former Acid and Alkali Waste Storage Area	At the time of the VSI, no hazardous wastes were being stored at this unit, and no evidence of a historical release was observed.	Low Priority	Unknown/No documented actions identified in the file material.	None based on PA/VSI.
SWMU 19	Used Oil Storage Area	The nature and extent of implemented cleanup actions should be specified by WPSC. If not already completed, soil sampling should be conducted to confirm the adequacy of cleanup, particularly in the stained soil locations noted by OEPA. WPSC should also evaluate whether cracks observed in the concrete pad extend through the entire pad thickness and provide a pathway for contamination of underlying soil. If so, the underlying soil will also require sampling and analysis to determine potential environmental impacts. Finally, if necessary based on soil sampling results, focused groundwater sampling may also be appropriate for this area. In addition, additional action is warranted to prevent future releases to the environment from this SWMU. Because WPSC indicated that a historical release was most likely due to contact between infiltrating precipitation and the used oil storage containers, this storage area should be completely enclosed with walls on all four sides. Furthermore, retrofitting the area with secondary containment is strongly recommended to prevent migration of spills and/or oil-impacted stormwater runoff to the surrounding environment. Alternatively, the used oil storage area may be relocated to an existing enclosure that would be more capable of containing spills and minimizing environmental releases. Regardless of location, WPSC should implement better housekeeping practices for management and transfer of used oil; spills and drippage observed on the outside of containers and floor in this area should be promptly addressed with absorbent materials to prevent future releases.	High Priority	Ohio EPA had directed the Facility to clean up the area and submit photographs of this area following the cleanup effort to demonstrate compliance. In a letter dated April 19, 2002, the Facility stated that the area had been remediated. According to the Facility's response to EPA's May 29, 2008, RCRA Section 3007 Request for Information, the stained surface area and soil in this area were cleaned up shortly after observation in November 2001.	1. It is unclear if Ohio EPA approved the remediation of this unit. 2. The PA/VSI recommended soil sampling in this area, if not already conducted, and potentially groundwater sampling based on the results of the soil sampling; however, it is unclear if this has been conducted.
SWMU 20	Multiple Exterior Solid Waste Containers	At the time of the VSI, no hazardous wastes were being stored in the observed containers. However, WPSC should investigate the source of, sample, and characterize the white substance observed on the concrete near the coal silo; clean up the release appropriately based on investigation and analytical results; and employ good housekeeping practices in this area to prevent future releases.	Medium Priority	Unknown/No documented actions identified in the file material.	Investigate and remediate the white substance release.
SWMU 21	Current Acid and Alkali Waste Storage Area Located East of the WWTP	The color, pH, and location of the observed green liquid are suggestive of an antifreeze leak, and the release area was promptly addressed by WPSC. Furthermore, there is no evidence of a release from the active acid and alkali tanks at this SWMU. This is an active area and any new leakage would be expected to be identified and addressed in a timely manner. Consequently, the likelihood of significant environmental impacts associated with this SWMU appears to be low.	Low Priority	Unknown/No documented actions identified in the file material.	None based on PA/VSI.
SWMU 22	Waste Water Treatment Plant	WPSC should provide specific RCRA waste characterization details for the WWTP sludge, including TCLP results if available. WPSC should provide information on the integrity of the concrete sludge storage pad and any past incidents of sludge migration from the pad into the surrounding area prior to loading for off-site disposal, so that the potential for releases may be assessed. Additionally, WPSC should consider transfer of the dewatered sludge from the conveyer belt directly into a waiting roll-off container, rather than creating an unenclosed waste pile outside the WWTP building (regardless of how temporarily the pile may be there) and creating the potential for wastes to be carried or tracked away from the concrete pad.	Medium Priority	Unknown/No documented actions identified in the file material.	Provide information on the integrity of the concrete sludge storage pad and any past incidents of sludge migration from the pad into the surrounding area, so that the potential for releases may be assessed.
SWMU 23	Hydrochloric Acid Storage Area	Although the potential for releases from this SWMU appears to be low based on secondary containment construction and the lack of documented spills, integrity of the concrete basin should be confirmed during tank replacement. WPSC should submit a report on the tank replacement project to EPA for review to ensure that deteriorating structures have been replaced and the potential for releases has been minimized.	Medium Priority	Unknown/No documented actions identified in the file material.	Confirm integrity of the concrete basin and lack of releases.
SWMU 24	Historic Used Oil Location	At the time of the VSI, no hazardous wastes were being stored at this location, and no evidence of a potential release was observed.	Low Priority	Unknown/No documented actions identified in the file material.	None based on PA/VSI.

Appendix B - Solid Waste Management Units and Areas of Concern
Historical Investigation Summary Report
4K Industrial Park, LLC Facility
Martins Ferry, Ohio

SWMU No.	Description	PA/VSI Recommendations/Conclusions	PA/VSI Priority Ranking for Further Action	Completed Actions	Potential Outstanding Issues/Tasks
SWMU 25	Waste Acid and Alkali Tank Located in the Basement Underneath the 60" Galvanizing Line	Given the age of the tank and the condition of the floor, WPSC should verify the integrity of the tank and ancillary equipment and determine whether releases have occurred or are occurring to the ground surrounding the tank. Depending on this assessment, soil and/or groundwater sampling may be required for this SWMU. WPSC should also employ better work practices in this area to prevent future overflows or leaks from this tank.	High Priority	Unknown/No documented actions identified in the file material.	Verify the integrity of the tank and ancillary equipment and determine whether releases have occurred in this area.
SWMU 26	Trench and Sump Located in the Basement Underneath the 60" Galvanizing Line	WPSC should confirm the dates of operation of this unit, document the frequency with which the sump is pumped out, and evaluate the integrity of both the sump and the trench. WPSC should also provide information on any significant upgrades to the trench or sump.	Medium Priority	Unknown/No documented actions identified in the file material.	Evaluate the integrity of the sump and the trench.
SWMU 27	Waste Acid and Alkali Holding Tank Located Along the 60" Galvanizing Line	Given the age of the tank, WPSC should confirm the integrity of the tank and the pipelines that deliver waste from SWMUs 25 and 26 and to the WWTP.	Medium Priority	Unknown/No documented actions identified in the file material.	Confirm the integrity of the tank and the pipelines.
SWMU 28	Cooling Water Tank Catch Basin Along the 60" Galvanizing Line	WPSC should confirm the integrity of the concrete catch basin and provide the dates of operation of this unit.	Medium Priority	Unknown/No documented actions identified in the file material.	Confirm the integrity of the concrete catch basin.
SWMU 29	Chem Treat Waste Tote Along the 60" Galvanizing Line	At the time of the VSI, no spills or staining were observed at this unit.	Low Priority	Unknown/No documented actions identified in the file material.	None based on PA/VSI.
SWMU 30	Waste Paint Accumulation Area Along the 60" Galvanizing Line	At the time of the VSI, no spills or staining were observed at this unit.	Low Priority	Unknown/No documented actions identified in the file material.	None based on PA/VSI.
SWMU 31	Chromic Acid Sludge from the 36" Galvanizing Line	Based on WPSC's response to EPA's May 29, 2008, RCRA Section 3007 Request for Information, the facility has appropriately disposed of the chromic acid sludge wastes while the 36" galvanizing line remains inactive.	Low Priority	Unknown/No documented actions identified in the file material.	None based on PA/VSI.
SWMU 32	Parts Washers	These units appeared to be in good condition at the time of the VSI, and no spills or staining were observed in association with these units.	Low Priority	Unknown/No documented actions identified in the file material.	None based on PA/VSI.
SWMU 33	Roll Grinding Waste	At the time of the VSI, no hazardous wastes were being stored at this unit, and no evidence of a potential release was observed.	Low Priority	Unknown/No documented actions identified in the file material.	None based on PA/VSI.
SWMU 34	Universal Waste Storage Area	The potential for significant environmental impacts associated with this SWMU appears to be low as long as good housekeeping practices are maintained.	Low Priority	Unknown/No documented actions identified in the file material.	None based on PA/VSI.
SWMU 35	NPDES Permitted Outfalls	WPSC should provide documentation to demonstrate current compliance with applicable National Pollutant Discharge Elimination System (NPDES) permit requirements. WPSC should also conduct a thorough trends analysis to determine if any patterns exist with regard to exceedance of permit conditions at each outfall. Where patterns exist, WPSC should implement additional controls (e.g., flocculation and/or pH adjustment basins, filters, skimmers) upstream of the outfall discharges to reduce, and perhaps eliminate, exceedances of applicable permit limits. WPSC should also review any available surface water and sediment, or collect such data, as part of an in-depth evaluation of environmental quality in the Ohio River. WPSC should collect and compare surface water and sediment data upstream of, adjacent to, and downstream of the property to quantify those impacts specifically attributable to WPSC discharges.	Medium Priority	Unknown/No documented actions identified in the file material.	Review any available surface water and sediment data, or collect such data, to evaluate environmental quality in the Ohio River, and quantify impacts specifically attributable to WPSC discharges.
AOC 1	Plant 1 Electrical Substation Transformers	According to WPSC's response to EPA's May 29, 2008, RCRA Section 3007 Request for Information, further investigation of soils inside the fenced substation area is not feasible until this substation is de-energized, and WPSC has no schedule for such activities at this time. It is recommended that the stained soil be removed, characterized, and properly disposed the next time the substation is de-energized (i.e., for routine maintenance). Furthermore, the transformers should be inspected for evidence of active leaks as soon as possible and repaired as necessary.	High Priority	During the PA/VSI on April 1, 2008, EPA collected two soil samples from the stained soil area underneath the transformers and sent them to the EPA Region 5 Central Regional Laboratory for PCB analysis. The sampling results indicated that PCBs were not detected in the sample at a reporting limit of 0.5 micrograms per gram, which was elevated due to matrix interferences from unspecified hydrocarbons.	Remove, characterize, and dispose of stained soil.
AOC 2	4,000-Gallon Gasoline UST Located in the Plant 1 Area	WPSC should ensure that operation and/or closure of this underground storage tank (UST) is performed in accordance with the Ohio Department of Commerce, Division of State Fire Marshall, Bureau of Underground Storage Tank Regulations (BUSTR). WPSC should provide EPA with a work plan specifying the means by which the UST and ancillary equipment will be formally closed (e.g., complete removal, decontamination and filling with an inert substance). The work plan should also outline WPSC's proposal for confirmation sampling to document the lack of significant residual petroleum-related constituents in underlying soil and/or groundwater. Until such time as the UST is closed, WPSC should continue required monitoring of the unit to detect any leakage that may occur as expeditiously as possible.	Medium Priority	Unknown/No documented actions identified in the file material.	Ensure that operation and/or closure of this UST is performed in accordance with BUSTR.
AOC 3	6,000-Gallon Diesel AST Located in the Plant 1 Area	WPSC should ensure that continued operation and monitoring of this aboveground storage tank is performed in accordance with BUSTR.	Low Priority	Unknown/No documented actions identified in the file material.	Ensure that operation and monitoring of this aboveground storage tank is performed in accordance with BUSTR. ***It is unclear if this issue remains applicable based on currently reported operations.*
AOC 4	Former Leaking UST Located in the Plant 1 Area	Further investigation or action, pending confirmation from WPSC that the no further action letter from BUSTR relates to AOC 4. If such confirmation cannot be provided, the priority level for this AOC may need to be elevated and WPSC should continue to comply with long-term monitoring and closure requirements pursuant to BUSTR.	Low Priority	Unknown/No documented actions identified in the file material.	Confirm this AOC received NFA from BUSTR.
AOC 5	Former Product Storage Area	WPSC should provide information on dates of operation of this area and the types of products, wastes, or other items historically stored here. WPSC should also provide information on any known historical releases in this area and any cleanup or sampling that has been performed at this AOC.	Medium Priority	Unknown/No documented actions identified in the file material.	Provide information on any historical releases and sampling/cleanup that have been conducted at this AOC.
AOC 6	Leaking Transformer Adjacent to the No. 1 Fire Station	WPSC should provide a summary of the electrical equipment contractor's findings and recommendations regarding risk of leaks from the transformer, and any repairs that may be required. In addition, WPSC should provide justification for their claim that polychlorinated biphenyls (PCBs) have never been used in Transformer TF-1A.	High Priority	Unknown/No documented actions identified in the file material.	Evaluate if a leak occurred and confirm lack of PCB usage in the transformer.

N/A	Drum Storage Pad	Not evaluated in PA/VSI.	N/A	Closure included removal of remaining waste drums and loose dirt from the storage pad, decontamination of the storage pad, verification of decontamination procedures, and inspection of the drum storage pad.	It is unclear if Ohio EPA approved the Drum Storage Pad Closure Report.

ATTACHMENT 3

EXCERPT FROM REFERENCE NO. 33

radioactive waste processing facility in Martins Ferry, Ohio. Results obtained along this transect were compared with background radioactivity measurements taken at a community park and a cemetery located up to 1 mile away from the facility. Transect samples with survey values more than twice that expressed from background measurements were collected for subsequent Gamma spectroscopy.

Figure 2 illustrates the location of samples collected during two visits to the site. Samples were first collected on November 9th, 2021 and labeled MWA in honor of guidance and assistance provided from members of the nonprofit environmental advocacy group Mountain Watershed Association. Approximately 10 grams of soil was collected directly into sealable plastic storage bags and shipped to Boston Chemical Data Corporation in Natick, MA for initial Gamma spectroscopic screening. Three of the samples (MWA 11, MWA 12, MWA 13) showed high total activity and were sent to Eberline Analytical/Oak Ridge Laboratory (Eberline Lab) in Oak Ridge, TN for additional radiological analysis. Due to low sample mass, the three samples were combined, blended and then divided in half to allow for a duplicate measurement.

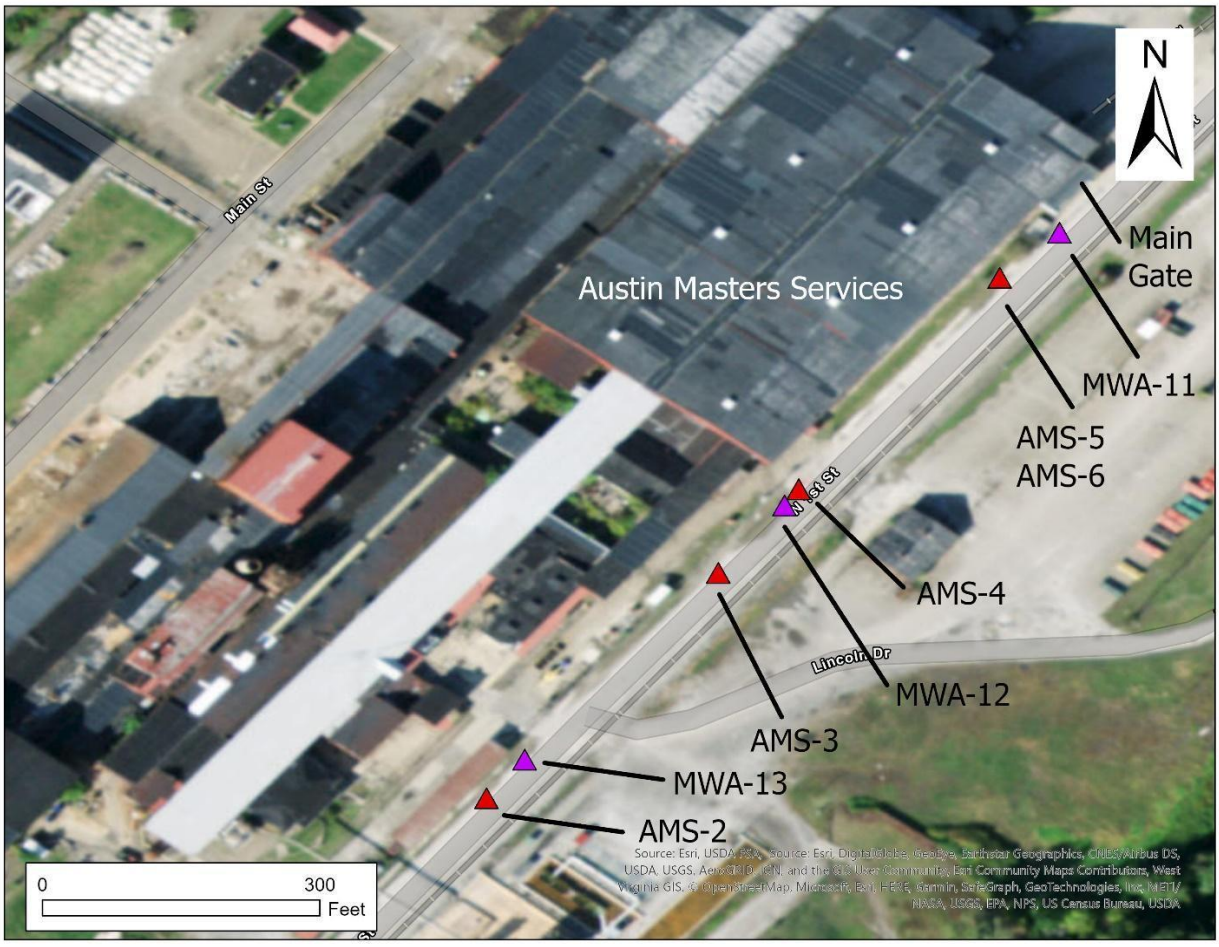


Figure 2. *Location of samples collected during two sampling expeditions. Note that samples MWA-11, AMS-5, and AMS-6, were taken closest to the building's Main Gate.*

A second set of samples was collected on February 16th, 2022 along the same transect used previously (Figure 2). Samples labeled AMS-2 through AMS-6 were collected in response to elevated radioactivity detected during soil surveys using the Ludlum Digital Survey Meter. Samples AMS-1 and AMS-7 represent background samples taken from a community park and cemetery, respectively. Approximately